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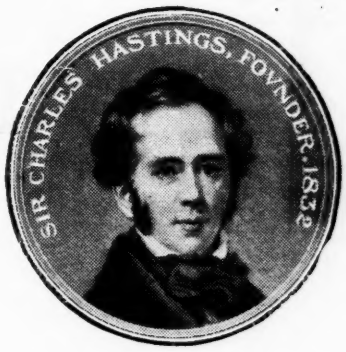

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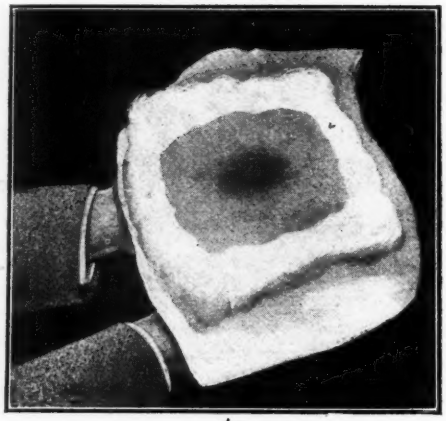

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DISCUSSION ON ANIMAL AND VEGETABLE PATHOLOGY IN RELATION TO HUMAN DISEASE.

OPENING PAPERS.

I.—ANIMAL PATHOLOGY IN RELATION TO HUMAN DISEASE.

BY

FREDERICK HOBDAY, C.M.G., F.R.C.V.S., F.R.S.E.,
Honorary Veterinary Surgeon to H.M. the King; formerly Professor in the Royal Veterinary College, London.

THE study of animal and vegetable pathology has many points in common with that of the study of human disease, and will well repay a much greater research in the future than has been made in the past.

Members of the medical and veterinary professions have much in common, and to collaborate more closely and interchange their ideas cannot help but be of mutual benefit, not only to themselves but to the world in general, as the day of the "watertight compartment" system of opposing the ravage of disease is past. By progressing hand in hand much interlocking of ideas and side-tracking can be avoided and a more rapid advance gained against the common foe.

The *vegetable* aspect of the question is in the able hands of Professor Lang, F.R.S., and in the time at my disposal I shall endeavour to draw your attention to some of the salient reasons which concern *animal* pathology in relation to human disease.

That there are a number of diseases communicable from animals to man is well known, but the important part played by the trained veterinarian in preventing this communication has not yet been sufficiently appreciated, and in certain of these diseases the worker on the animal side *must*, of necessity, occupy the front trench, in order effectively to protect his medical colleagues and their human patients.

We have at the present time in Great Britain at least the following, which are indisputably communicable: glanders, rabies, anthrax, tuberculosis, foot-and-mouth disease, cowpox, mange of all animals (horses, cattle, dogs, and cats), ringworm (especially of the horse, calf, cat, and mouse), and certain forms of seborrhœa (such as blacksmiths contract from handling horses with greasy legs). The *Bacillus abortus* of Bang is also under suspicion as a source of contagion from cattle, and I think that the great prevalence of pyorrhœa in pet dogs (which are kissed by their fair owners and allowed to lick their lips and hands) should be regarded as a possible factor in the spread of that disease in human beings.

Others produced by parasites require an animal host in order to make their respective life cycles complete before they can become pathogenic to man, such, for example, being the echinococcus, the *Cysticercus bovis* (the larval stage of the *Taenia saginata* of man) and *Cysticercus cellulosae* (the larval stage of *Taenia solium*), the parasites of measly beef and measly pork respectively; and the *Trichina spiralis* of the muscles of the pig, which give rise to trichinosis in man in countries where ham is largely eaten smoked and not necessarily cooked.

Then, in addition to those which are intercommunicable, we have in animals many diseases which are analogous to those in man—analogous in many ways in symptomatology, in the situations of the body which are attacked, in the ravages set up in the various body organs and in other ways, the knowledge of which sets one thinking, and often deters one from making grave errors of diagnosis and judgement.

Take, for example, the old-time instance of the man with the cirrhotic liver. There was a time when excessive indulgence in alcohol was almost always blamed for this, and the term given, "gin-drinkers' liver," was a byword. Animals are not alcoholic, and yet cirrhosis of the liver is one of the commonest things observed when making *post-mortem* examinations of old animals.

The study of cancer is equally interesting in animals as in man, probably almost more so, and the situations on which this disease occurs in our respective classes of patients are well worth serious thought when considering the irritation, and other, theories.

The knowledge that certain species of animals are refractory (or even completely immune) to certain diseases is of enormous value to the student of disease problems, and this fact requires a satisfactory explanation, if only it can be discovered. The immunity of the ox tribe to glanders is the best illustration of a disease of this kind.

Why should the ox be immune to glanders, when the horse, ass, mule, certain carnivora, and man, fall easy victims to it? There must be a valid reason, and if only that knowledge could be attained, and put into practical shape for purposes of conferring immunity on those susceptible, the fight against glanders would have scored a point—a great point, too—on the side of progress. Then again, one must not forget the danger of the animal as a carrier of disease, so that to the scientific worker a knowledge of the habits of the animal in health is as useful and necessary as a knowledge of the symptoms when in a state of disease.

The time is not long enough to take each disease in full detail, as to each one might allot a whole day, and then not exhaust all the comparative aspect, so that it is my intention briefly to bring forward for your consideration the most salient points which affect man and the lower animals mutually, and particularly emphasize in this category the value of a mutual collaboration between the medical and veterinary professions.

Let me read you a brief paragraph I cut out of a morning paper only so recently as the 6th of last month. A Reuter telegram which was sent from Helsingfors, and came to London via Paris, is as follows:

> "The *Soviet Red Gazette* announces that the Bolshevist authorities in one of the famine districts, 'for humanitarian and sanitary reasons,' have shot 117 children afflicted with glanders which developed after eating the flesh of horses suffering from that complaint."

It makes one meditate, safe within this England of ours, what can occur when the laws of preventive comparative medicine are disregarded, and is a striking instance of the value of the trained veterinarian to his medical confrère and the general public.

Glanders and rabies, two of the most horrible diseases which can affect man or beast, show what can be done by organized collaboration of the two professions. Each is primarily a disease of animals, and only comes to man from them.

Let the veterinary scientist eradicate glanders from his patients of the horse tribe, and rabies from the canine race, and neither of these diseases will appear in man; and I am happy to say that there is every reasonable hope that by the end of this year this will have been achieved in regard to Great Britain. The credit for this important result, which is of equal importance to man and animals, must be given entirely to those to whom it is due, the veterinary advisers (with Sir Stewart Stockman and Sir John McFadyean at their head) of the Ministry of Agriculture; and so long as we maintain a rigid system of mallein testing and quarantine under expert veterinary supervision on all animals of the horse tribe before they are allowed to enter the country, there will be no danger of the reintroduction of glanders to Great Britain.

Glanders.

I can remember the time when London was so full of glanders that every stable groom, and particularly those in cab and omnibus stables, knew the meaning of the word "glanders" as well as he knew the hour of his midday meal.

In 1901 (only twenty years ago), some 2,370 horses were destroyed for glanders in Great Britain (1,828 from London alone), whereas the statistics of the Ministry of Agriculture show that for this year, up to the present date, no case has been reported.

The discovery of mallein, and the mallein test, placed in our hands an infallible method for the detection of glanders, and by its means the disease can within a very short space of time be, with certainty, eradicated.

By its aid, applied by the officers of the Royal Army Veterinary Corps, glanders was completely kept under control amongst the hundreds of thousands of horses and mules in the British army during the recent war; and afterwards some 150,000 were sold to the public with perfect safety; and I believe I am right in saying that, in the British army, no case in man was reported during the whole of the war.

Twice have I been present officially in civilian life at the *post-mortem* examination of men who had died of glanders, and in neither case was the disease suspected by the medical attendant until just before death, one patient being treated for about ten months for chronic rheumatism and the other for chronic pleurisy.

The infection is usually transmitted to man from a glandered horse, ass, or mule, by discharge from the nose, from a farcy bud, or by contact of an abraded surface with a sponge or brush (stable utensil) which has become contaminated with some of the infectious discharge from a horse or mule. The men most commonly infected are those whose life brings them in contact with horses or with the preparation of glanders cultures, and records in medical journals show the hopelessness of treatment when once the disease has gained a foothold.

I believe I am correct in saying that there is only one man alive in Great Britain at the present time who had been indubitably infected with glanders and completely recovered. I refer to Professor Gaiger, the energetic Principal of the Glasgow Veterinary College, who has published a full description of his own case in the *Journal of Comparative Pathology and Therapeutics* (1913 and 1916). It is a most fascinating account of a plucky fight against a loathsome and terrible disease, and is of great scientific interest.

It is appropriate that Professor Gaiger should be with us at this meeting to-day, and I am sure that I am expressing the wishes of all of us who are present when I say that we all, medical and veterinary alike, congratulate him and his medical advisers on the successful issue to the gallant fight that was made for his life.

FIG. 1.—Intradermo-palpebral reaction to mallein. (From the clinical article in the *Veterinary Journal*, August, 1920, by Captain Howard B. Collet, B.V.Sc., M.R.C.V.S.)

Rabies.

The energetic watchfulness of the veterinary officials of the Ministry of Agriculture has kept Great Britain free from rabies for nearly twenty years, and until some thoughtless person committed the stupid and criminal offence of surreptitiously smuggling a dog (which happened to be infected and in the incubative stage) into the country, the much dreaded disease existed in this country only in name.

The first case was reported in the district of Plymouth about May, 1918, and during 1919 alone some 179 persons were bitten by animals in the scheduled areas, 46 of them by animals proved to be rabid. Prompt measures were taken, and treatment was arranged by the medical department of the Ministry of Health, and it is a triumphant tribute to the memory of Pasteur that there have been no deaths in England from hydrophobia. Under the present laws the head and neck of a suspected dog are sent to the Veterinary Laboratory of the Ministry of Agriculture, together with as much history as can be collected by the veterinary inspector to whom the case has been reported. The Negri bodies are searched for and inoculation made if necessary, with the result that in 96 per cent. of cases a decision can be given within a few hours, thus saving those who have been bitten much painful suspense and anxiety; and, what is more, enabling the medical officer, if necessary, to advise and immediately commence antirabic treatment.

All Continental countries, with the exception of Norway, Sweden, and Denmark, are infected, and although mainly seen in the dog, rabies is also met with in the horse, cow, sheep, cat, fox, wolf, and even the fowl.

In some of these veterinary patients rabies produces a train of symptoms which are rather curious, and which to the layman may not give rise to any suspicion of the disease, and thus perhaps lead to disaster.

Everyone knows something about the suspicious signs in the dog, although the classical symptoms are by no means constant. The change of manner, desire to hide in dark places, great excitability, restlessness, snapping at imaginary objects, attempts to swallow, the futile attempts to drink water, and the final rage in the violent forms, or the typically dropped jaw in the paralytic form, are all characteristic of the rabid dog. It is strange, too, what long distances dogs will wander in their unconscious frenzy, and it is for this reason that large areas have to be placed under restriction. The bark becomes changed and the peculiar howl of a rabid dog, once heard, can never be forgotten. Paralysis of the hind quarters and complete exhaustion finally close the scene if the disease is allowed to terminate the poor brute's existence.

A rabid cat is even more to be feared than a rabid dog, as it will attack either man or animal in a most reckless fashion; the disease terminates in death preceded by a stage of paralysis of the hind quarters. In the horse and ox one particular symptom which has been frequently observed is a tendency to attempt to bite or rub the scar at the site of infection, whilst in the sheep sexual excitement has frequently been noted.

Until the muzzling order has been finally withdrawn from every district it is necessary for both medical and veterinary practitioners to be on the alert for rabies, but there is every reason to hope that before the end of this year this disease, like glanders, will be relegated to its place with those which are only memories and no longer realities. Here again the veterinarian can say that he is of signal service to his medical colleague.

Anthrax.

Anthrax has been very much in evidence, both as regards man and animals, during the past few years, and it is time that very much sterner preventive measures were taken against it. As the editor of a professional journal I get cuttings from press agencies all over the country, and it is rare for a week to pass without receiving evidence of its appearance in either man or beast. When it is of sufficient importance for the public press to notice it constantly one may reasonably surmise that it has become fairly prevalent.

It is a scheduled disease, and Government statistics prove its prevalence in man, particularly amongst those who deal with skin, hides, wool, and hair from abroad, and those who make, or assist at, *post-mortem* examinations of animals dead of it.

The veterinary practitioner sees the disease most commonly in cattle, although it may be met with in the horse, sheep, pig, and even the dog; the latter animal is, however, less susceptible than the others.

Bone manure, foreign cake, and other feeding stuffs, obtained from countries where anthrax is rife and improperly controlled, are blamed largely for its appearance amongst stock. It is a

troublesome disease and difficult to control, but the precautions of the Ministry of Agriculture have reduced the number of outbreaks very considerably; and if only the disinfection of imported things such as hides, wool, and hair, and even the much abused Japanese shaving brush, can be effectually controlled on entry into the country we shall hear of fewer cases in man. The same may be said in regard to the supply of cotton and other cakes imported into Great Britain as a food for cattle.

It is practically always through animals or animal products that anthrax reaches man, so that to stamp it out of the lower animals would mean its eradication from man—a further proof of the necessity for close combination between the veterinary and the human medical professions, and the importance of the study of animal pathology in relation to human disease.

Several communications to be read before the meeting to-day bear on the subject of the intercommunicability of this disease from animals to man, and its seriousness when once contracted.

Sclavo's serum, the sheet anchor in the human treatment, is unreliable for the animal, and both in horses and cattle this disease still holds its own as one of the most rapidly fatal, for the patients of the veterinarian, of all the microbial diseases.

Tuberculosis.

If there is one disease more than another to which attention is to be drawn as an instance of the importance of animal pathology in relation to human disease, it is tuberculosis. To medical men and veterinarians alike it is one of the most important and devastating diseases of the day, and when one reads statements that no less than 85 per cent. of the cases of tuberculosis of the glands of the neck occurring in children are of bovine origin, that over 10,000 children die annually from drinking tuberculous milk, and that we have fully a million tuberculous cattle in Great Britain, it makes one shudder and wonder what our sanitary advisers and legislators are doing in regard to tackling the question from the animal standpoint.

FIG. 2.—Typical eye (intradermal) and neck (hypodermic) reactions on a glandered horse. (Captain Hewer's clinical article, *Veterinary Journal*, vol. 27.)

One scarcely ever picks up a daily paper without reading some statement or other about tuberculous milk, and I cannot understand why the Cattle Tuberculosis Order, which was really making headway in 1914, and was temporarily suspended during the war, has not been re-established.

The report of the Medical Officer of Health for the City of London (Dr. W. J. Howarth) for 1921 states that out of 50 consecutive samples of milk purchased in the City no less than one in four proved to be tuberculous; and Dr. Bigger, at the last meeting of the Statistical and Social Society of Ireland, asserted that 6 per cent. of all deaths from tuberculosis was due to drinking tuberculous milk.

Does it not seem astonishing that such a state of affairs can exist in Great Britain, the richest and most sanitary country in the world? Yet we do not move, although it costs us 10,000 human deaths annually, and the loss of many hundreds of thousands of pounds to the agricultural and dairying communities.

Surely it is time a move was made to enforce that milk, when sold, should be clean and free from tubercle, and, if it is not asking too much at this, my first appearance before you, I would like a resolution to go up from this meeting in similar terms to that which was unanimously passed at the combined meeting of the Royal Society of Medicine and the Central Veterinary Medical Society, on the proposition of Sir John McFadyean, in March last, namely:

"That the prevalence of tuberculosis in cattle in this country continues to be a serious menace to the health of human beings, and that to counteract this danger, the reintroduction of the Animals' Tuberculosis Order, which was suspended in 1914, is urgently needed."

Given a free hand, we of the veterinary profession could stamp out tuberculosis of cattle in the same way as we have stamped out glanders and rabies. It would take time and would cost money, but the saving of the suffering and misery entailed by the loss of 10,000 human lives annually would more than counterbalance that, and surely should weigh down the right-side scalepan. Money ought not to count where human life is at stake. Having done our part, it would then rest with us to see that this bovine scourge never again got the upper hand, and was relegated to the same position which is now held by glanders and rabies. By doing so we should have again proved the value of having worked together, as opposed to the plan of separate and watertight compartments.

At the present moment a method of immunization of calves, introduced by Dr. Nathan Raw, is on trial, but it is too early yet to say anything about its results. Should it prove successful, it will be one of the greatest boons ever conferred upon the agriculturist, and, through agriculture, to mankind, for it will materially help to abolish this dire disease from this country.

Foot-and-Mouth Disease.

Although mainly a disease of cattle, sheep, and pigs, foot-and-mouth disease is of importance because of the risk of the milk for mankind, especially for children. For the moment it has gained a footing in Great Britain, and has cost the taxpayer already over a million pounds. A few instances have been reported of contagion to man, but in reality, owing to the strict quarantine and stamping-out methods of the officials of the Ministry of Agriculture, the disease has not had much opportunity to spread in this direction. Beyond, therefore, alluding to it in passing, and making the statement that it is one of the most insidiously contagious diseases of cattle with which we have to deal, I will not dwell upon it now. Some indication as to the extent to which it will spread may be gathered from the statement that in 1892 in Germany no fewer than 1,504,299 cattle, 2,193,157 sheep, 17,782 goats, and 438,262 pigs were affected in one year's outbreak alone.

Cow-pox.

This disease, too, I propose to pass over with a mere allusion, as it has, since the time of Dr. Jenner, received such widespread publicity that its position is definite, and everyone whether medical man, veterinarian, or agricultural herdsman, knows full well its importance in animal pathology in relation to human disease. It is highly infective from cattle to man, and although its course in man is tolerably benign, yet it is one of those little things which we would rather be without.

Mange.

The horse, cow, camel, pig, dog, and cat each has its special varieties of parasite, and it only needs a certain length of time in contact with the skin of man for the acarus to change his residence.

Three varieties of parasite are found on the horse—a sarcopt, a psoropt, and a symbiote, the two former being those which most commonly transfer themselves to man.

Grooming a mangy horse is risky, and riding one is almost certain to transmit the ailment. Knackermen are frequently

infected when employed in skinning mangy horses; and a recent case reported in the *Lancet* by Mr. A. S. Macdonald, B.Sc., M.R.C.V.S., proves that the veterinary student is by no means immune. The circumstances were a little peculiar, and worth relating:

A class of veterinary students were engaged in performing *post-mortem* operations on a horse. The horse had generalized sarcoptic mange, and was very badly affected. It was destroyed one Saturday morning at 10 o'clock, and thereafter was left lying upon a concrete floor while the students in question palpated, dissected, and operated upon the carcass for a period of time which varied with the individual from two to five hours. Of the students who had any contact with the carcass in question, approximately 53 per cent. became infected. On the other hand, the non-infected individuals were either those who were engaged upon the head and neck (which parts had been cured by the previous treatment) or those who had been little more than onlookers, in that they had been engaged in swabbing incisions, etc., to assist the actual operators. In short, of those students whose hands and clothing came into direct and prolonged contact with the infected carcass 100 per cent. complained of subsequent symptoms.

The most constant symptoms common to every case were:

(*a*) Itch of a most pronounced and continuous nature, accentuated by surface warmth, induced by exercise, by lying in bed, and by friction in the process of inunction of the affected areas.

(*b*) A papular eruption. This was present in all the affected cases at the site of contact with the carcass—*i.e.*, forearms, ankles, and calves of the legs. The hands in most cases, though not in all, escaped infection, no doubt owing to washing with carbolic soap immediately after, or in some cases during, the work on the dead subject. In some cases the forearms escaped while the ankles were affected, or vice versa. Lesions on the shoulders, upper arms, trunk, and thighs occurring in some of the students were in all cases secondary, there being no direct track of infection on the skin. The papules were the size of a large pin's head, of a fiery-red colour, and were slightly elevated above the surface of the surrounding skin. They seemed to correspond to hair follicles, and the crops were luxurious. It is perhaps significant that in one the interdigital spaces were the seat of the infection; here also the papules were more circumscribed, more elevated, and slightly pointed.

Treatment was troublesome, consisting mainly of hot baths and the after application of sulphur preparations, but eventually all made a complete recovery.

In Great Britain mange in the horse is a notifiable disease, and must be reported to the authorities, but mange in the dog is not.

That mange in the dog and cat is transmissible to man does not seem to be so generally known in the medical profession as it should be, and some time ago Dr. Whitfield and myself published the histories of some seventeen cases, in which he confirmed the existence in the human subjects, and I in the dog.

In a canine *clientèle* one frequently gets a person with an itchy dog who complains of an irritable skin, and in a very high proportion of cases, if the dog has mange, the owner will have contracted it. Small vesicles are produced, scattered over the surface, and not in grouped lesions. The intense irritation leads to scratching and the consequent decapitation of the little vesicles, and their original site becomes covered with a serous or a blood scab. If left untreated, the canine sarcopt will live on the human subject for about six weeks, but, if recognized and treated, I understand that it is easily got rid of. Several communications upon this subject will be presented to you by others interested in the comparative pathology side of the question.

Ringworm.

All the ringworms of animals are contagious to man. Every cowman knows of the risk he runs when dressing calves, or cattle, suffering from this complaint, and the ringworm of the horse is also contagious. The man who gets infected with either does so with his eyes open; but in the coat of the domesticated cat there lurks an unexpected danger which might not occur to one to suspect, did one not know. The cat's hair can be a carrier of ringworm spores without necessarily becoming infected to a sufficient extent for an owner to see it. In fact, it may escape the attention of the medical attendant and veterinary attendant alike for a considerable time; to fix this upon your attention I shall ask you to take note of the report of a case of transmission of ringworm from a cat to some children, which has been sent to-day by Mr. E. Livesey, M.R.C.V.S., in detail:

Briefly, the facts were that Mr. Livesey was asked to examine a young cat, in regard to the presence or absence of skin disease. He failed to find anything, but within three weeks developed tinea circinata on his left wrist, several other places following later. His wife, too, developed lesions. The owners of the cat developed it, as also five other persons in the house of a friend to whom it was given as a present. Further microscopical examination of the hair of the coat behind the ears revealed tinea spores, and the source of the infection was thus explained. In all, 15 people were affected.

Measles, Trichinosis, etc.

To the diseases found in meat I propose to do no more than allude, as they in themselves would form a separate paper of great importance. Suffice it to say that they play their part in the category covered by the title of the paper, in that they come under "Animal pathology in relation to human disease." Their presence furnishes a plea for proper and efficient meat inspection, the general neglect of which in England is deplorable.

It is entirely owing to the fact that we cook our food well that we enjoy our freedom from diseases in which a portion of the life history must be spent in an animal and part in man; a further tribute to the necessity for the study of comparative animal pathology.

Conclusion.

In conclusion, I desire to congratulate those of the Committee who selected as the title for the discussion "Animal and vegetable pathology in relation to human disease," for its part is an important one, and there are numbers of diseases which are intercommunicable and analogous. It behoves us to work together, to exchange ideas, and to work in unison, and by doing so we shall hasten forward the good work which is being done daily in the combat against disease.

Note.—A number of case reports and actual instances of the above diseases being communicated from animals to man were read by the essayist at intervals during his paper, the names of the medical and veterinary authors being given in each case. Space does not permit of these being given in detail.

II.—SOME ASPECTS OF VEGETABLE PATHOLOGY IN RELATION TO HUMAN DISEASE.

BY

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DIRECT comparisons between the normal development and construction of plants and animals have often proved more misleading than helpful, and it is even more necessary to be on guard against false analogies when the comparison is extended to pathological processes. The common features of all living things justifies the attempt, but it is well to maintain a critical rather than an optimistic attitude.

Evolutionary history shows that the connexion between plants and animals lay very far back, and is particularly indirect for the higher animals and the higher plants. Pathological reactions and processes have a similarly long history behind them, though we can hardly hope to get more than occasional records of them from the fossils. If we could compare the reactions, for instance, to wounding, in the earliest vertebrate animals and the earliest land plants we should doubtless find them as dissimilar in essentials as those of a man and a flowering plant to-day.

Some ancient plants recently found in the Old Red Sandstone of Scotland afford the earliest examples of pathological reactions of the tissues of plants that I know. These plants had, like other land plants, an epidermis with minute openings or stomata through which gaseous interchanges between the air and the internal atmosphere in the intercellular spaces took place. Noxious gases, perhaps the result of volcanic activity in the neighbourhood, appear to have sometimes entered the stomata, stimulating the cells around and underneath to enlarge and divide. The interest of the small projections of tissue thus produced lies in their remarkable similarity to the intumescences formed in some living plants when exposed to irritating vapours. The resemblances of the pathological reactions of these Devonian plants and those of the present day do not stop here. When the unknown cause had led to the necrosis of a portion of the tissues of the stem, the adjoining living cells reacted by enlargement and repeated division to the presence of the necrosed mass or the wound left by its decay and disappearance. The result in some cases is as beautiful an example of wound-callus, progressing towards the obliteration of the cavity and the healing of the wound, as can be obtained from living plants. The perfection of the preservation of this, the most ancient wound reaction that is known, is of interest for its own sake, and will serve as a starting point for some general

considerations on reactions of vegetable tissues to irritants and parasites.

Even from this example it will be obvious that a general correspondence can be traced between the healing of a wound in the plant and animal body. If, however, we were tempted to make more specific comparisons—for instance, between the processes of the wound-callus and the projections of granulation tissue in an animal wound—we should probably get astray and pass from scientific study into regions of fancy.

The same general conceptions arise in the study of diseases of plants and animals, and the same names, such as wound reactions, parasitic diseases, and tumours, are naturally used. The interest of comparison in all these cases has long been recognized by human pathologists, though it can hardly be said to have been actually useful.

Of late years very direct comparisons have been made between a remarkable disease of plants known as "crown gall" and malignant tumours in man and animals. It will afford the necessary limitation to the scope of my remarks if they are made to bear on the consideration of this disease and of these comparisons. I venture to do this since I have had the advantage of being in close touch with a study of crown gall which Dr. Wilfrid Robinson and Mr. H. Walkden have been making in my laboratory. Without anticipating their results, which will shortly be published, this will enable me to present some of the problems suggested by the published accounts of this disease in a form that may be of use in this discussion.

The tumour-like growths of crown gall have long been known, especially in relation to wounds made in cultivated plants from horticultural operations such as grafting. The disease was proved to be transmissible from one plant to another, and was later shown by Smith and Townsend to depend on a bacterium which they successfully isolated and named *Bacterium tumefaciens*. The causal organism having thus been obtained in pure culture, the experimental production of the disease has been extensively carried out, especially by Erwin Smith. We owe much of our knowledge of crown gall to his papers, which contain a wealth of illustration by excellent photographs of the varied effects of the introduction of *Bacterium tumefaciens* into a number of different plants.

Bacterium tumefaciens is a rod-shaped bacillus with rounded ends, 1.2 to 1.5 μ long by 0.5 to 0.6 μ broad, and motile by means of one, or occasionally two or three, polar flagella. Its cultural reactions have been fully studied by Smith and, as independently isolated in this country, by Walkden. Its regular occurrence in relation to the crown-gall tumours has been proved bacteriologically by obtaining from them pure cultures of the organism which can again cause the disease.

The main features of the growths caused by this bacterium may be briefly stated. There is no evidence that infection occurs except by a wound, though a needle-prick is sufficient. The galls have been obtained on roots, stems, and leaves of many plants, attaining the largest size when the inoculation affects immature tissues or the cambium of stems with secondary growth. Especially large tumours form on parts with very active and anomalous secondary thickening, such as the root of the sugar beet. What have been distinguished by Smith as secondary tumours appear in some cases at a distance from the main tumour. When the inoculation is made into apical or axillary buds the further growth of these is profoundly disturbed and irregular growths bearing more or less altered organs (leaves, shoots, flowers) result. Definite organs of the plant may also appear on tumours apart from pre-existing rudiments. Thus roots develop in the condition known as "hairy root," and shoots when inoculations have been made on the cut surface of a young internode, into the internode of a stem, or into the midribs of a young leaf.

The tissues of the gall or tumour, resulting from the stimulation of unknown nature exerted by *Bacterium tumefaciens* on the more or less immature part of the host plant, show an abundant irregular multiplication of cells. Some of the resulting meristematic cells undergo differentiation into mature tissue elements, especially into those of an irregularly arranged wood. Others may form the starting point for the adventitiously developed organs (roots, shoots) mentioned above. The published figures show that the effect may extend back some distance from the inoculated surface in the vascular bundles. Smith holds that there is an actual infiltration of the tumour cells between the normal cells of the tissues around, and explains in this way the origin of the secondary tumours connected by tumour strands with the main tumour.

On the ground of such facts as have now been summarized Smith makes detailed comparisons with malignant tumours of man and animals, and also treats the production of new organs in crown gall as comparable to the embryomata and teratomata of the animal pathologist. Further observations and comparisons on these lines have been made by Jensen, both by inoculating crown-gall bacteria into beets and also on certain tumours of this plant from which it is not clear that *Bacterium tumefaciens* can be obtained. Jensen has successfully transferred the latter tumours by grafting between yellow and red forms of *Beta;* these grafts show little indication of any real infiltration of the normal tissue.

In attempting to form a critical estimate of this disease, and of the comparisons that have been made between it and pathological processes in man, we must take into account the normal construction and mode of growth of the affected portions of the plant as contrasted with animal tissues; the reactions to wounding in plants; the reactions of the plant to various parasitic organisms; and the relation of tumour formation in the plant to wounds and parasites. It will be found that these problems are connected, and that collectively their consideration puts us in a better position to appreciate the reactions of the vegetable tissues to the crown-gall bacterium.

The absence of a nervous system, and, still more important, of anything corresponding to the circulatory system of the higher animals, must always be kept in mind when considering disease reactions in the plant. Along with the absence of blood and lymph we must note the special type of the tissues in plants due to their being composed of cells with the protoplasts enclosed by cell walls. Another important difference from the higher animals is found in the continued development of most plants. The formation of new tissues and organs continues throughout life at the growing points of the stems and roots. The enlargement of the parts thus laid down, and the separation of such organs as the leaves of the bud, takes place as their cells become vacuolated in attaining their mature size and condition. In addition to the activity of the primary meristems at the growing points a continued production of new tissues proceeds from layers of meristematic tissues within the plant. The most important of these layers is the cambium, between the wood and the bast, to which secondary thickening is due.

Many of the features of the reactions in crown gall depend on these general characteristics of growth and construction in the plant. A point to which attention may be specially directed is that the distance over which the effect of an inoculation is manifest may be almost entirely due to the subsequent enlargement and separation of the parts as the bud expands into a shoot. This will be seen to have an important bearing on the distance separating the secondary from the main tumours.

The condition of correlation between the parts of the whole organism controls in the plant, not merely the balance of the mature tissues, but the production of new organs and the arrangement of these and of their tissues. This correlation becomes evident when it is disturbed in any way, and plays an important part in the pathological reactions to wounds or parasites. The removal of parts of the plant—for instance, of the terminal bud—may so alter the balance of the whole as to cause dormant growing points to become active or others to change their reaction to the environment.

When the tissues are relatively mature there may be little reaction at the wound itself, save some drying of the surface or the production of a protective layer of cork. In other cases a marked alteration of growth indicates the disturbance of the normal correlation of the tissues. This is best seen when the latter are immature, but wounding may lead to a rejuvenation of the adjacent living cells even when these form a mature tissue. Thus in the wound reactions of stems of dicotyledonous plants living cells of the cortex and pith proliferate to form a new growth of wound-callus, but the main development of this is from the meristematic layer of the cambium. The effect may extend some distance back from the wound, and the callus itself may not only close the wound but may become the seat of new growths such as shoots or roots. The cells of the callus become organized as permanent tissue, which often has an irregular or atypical arrangement, as is best seen in the characters of wound-wood.

A number of the features of crown gall will thus be seen to be paralleled in wound reactions of plants. The causal influence of *Bacterium tumefaciens* is, however, shown by the fact that callus-like galls of considerable size develop where

there would otherwise be only a relatively slight wound reaction in the particular plant.

The tissues of the normal intact plant are free from foreign organisms except in certain cases of symbiosis, which for our present purpose can be grouped with parasitic diseases. The effect of intrusive parasitic organisms differs in accordance with the specific nature of both host and parasite. There may be little or no evidence of reaction on the part of the host; this is especially the case when the affected parts are relatively mature. Marked reactions are usually associated with incompletely differentiated tissues or with meristems, whether primary or secondary.

The numerous new growths or galls on plants due to parasitic animals can only be mentioned without entering into details as to their variety. They always involve more or less wounding, but the effect of the secretions and excretions of the animal parasite in the gall is predominant. A detail of some interest to animal pathologists is the production of multinucleate giant cells in relation to the presence of parasitic eel-worms in the roots of various plants, in other galls, and in crown gall itself. The common oak-apple may be mentioned as one example of insect galls on account of the similarities which it, like some specimens of crown gall, shows to the development of wound-callus on the end of a cut stem. In this case the terminal bud of the oak is, in fact, considerably wounded by the gall-insect before she lays her eggs. The further callus-like growth which encloses these in the soft tissues of the gall is mainly due not to the wounding but to the irritation of the parasites.

Marked reactions to parasitic organisms without the complication of wounding are found in the case of vegetable parasites. Striking examples are afforded by the wart disease of the potato, where axillary buds are affected by *Synchytrium endobioticum*, and by club-root, where the cambium and secondary tissues of the cabbage or turnip are stimulated by the presence of plasmodiophora brassicae within the cells. The alterations of form of the host-plants due to uredineous fungi affecting the primary or secondary meristems or immature tissues can be contrasted with the relatively slight reactions due to similar fungi affecting more fully grown stems and leaves. In some cases, as in certain fern leaves affected by Exoascaceae, new leaf-like growths result from the presence of a fungus.

Many bacterial diseases of plants are of the nature of "rots" with little or no reaction, but in the bacteriosis of the olive tree we find irregular tumour-like growths with the causal organism evident in cavities. The well-known root tubercles of the Leguminosae afford another example of a marked reaction due to the intrusion of a bacterium, the presence of which is in this case beneficial to the host.

In the various cases of irritation by animal or vegetable parasites resemblances to crown gall are evident. This is of course not surprising, since we know that this disease is due to the influence of a parasitic bacterium.

Tumour-like growths in plants are in many cases, as will be evident from what has been said above, the result of the stimulation due to parasitic organisms. Others are due to wounding or are associated with the wound-callus formed as a reaction to this. Some of the globular woody tumours found in the cortex of trees are of this nature, the wood developing from layers of cambium formed around groups of cells of the bark. Other tumours, superficially like these, have their cambium derived from that of dormant buds which may lose their connexion with the wood of the trunk. The latter examples have long been recognized as giving a point of comparison in plants to Cohnheim's explanation of the origin of animal tumours. True tumours, apart from wounding or the presence of parasites, are, however, rare in plants, and comparison with animal tumours is thus limited. In all tumour-like growths in plants the tissues are liable to be more or less atypical in their histology.

In the light of this brief survey of some other pathological reactions in plants crown gall appears as a particular case of a callus-like tumour growth following on the introduction by a wound of *Bacterium tumefaciens*. There is no doubt that the resemblances between the appearances presented by sections of some of the tumour-like growths in this disease and animal tumours are striking and may well interest the human pathologist. To what extent even in the case of this particularly favourable plant disease it is wise, safe, or useful to make specific comparisons with particular pathological processes in man is, however, open to discussion.

How closely the comparisons between crown gall and malignant animal tumours have been pressed can be seen by reference to Erwin Smith's papers and his recent *Introduction to Bacterial Diseases of Plants*.

The importance and interest of the pathological processes in crown gall fully justify their comprehensive study which we owe so largely to the work of this investigator. It does not appear possible, however, to accept on the evidence before us all these direct comparisons with malignant tumours in animals, nor to draw conclusions as to the etiology of the later from the undoubted facts as to *Bacterium tumefaciens* being the cause of crown gall.

The cell multiplication and the imperfect differentiation of the resulting tissues have been seen to be common to a number of disturbed growths in plants. The tendency to a production of new organs from the crown-gall tumour is paralleled in the case of wound-callus, galls, and some parasitic diseases of plants. There is real danger of being misled by a name if we speak of these new growths in this plant as teratomata or embryomata. In regeneration in plants the formation of a complete plant from a somatic cell or group of cells is common. The conception of embryomatous tumours in animals involves the early distinction of the germinal layers and of somatic and reproductive cells; there is no strict parallel to this in plants.

Passing from these more general features to the peculiarities of crown gall which have been made the ground of special comparison with malignant tumours we find that some of the more critical facts are uncertain and in need of re-investigation. One of these concerns the actual place occupied by the bacteria in the crown-gall tumour, from which there is no doubt they can be obtained. In earlier accounts Smith figured bacteria in small numbers in the cytoplasm of the tumour cells. More recently he has stated that the bodies thus demonstrated are not bacteria. He still, however, assumes that bacteria are present within the cells, and are there liberating products which lead to the tumour growth. As the matter stands there seems no evidence for arguing from crown gall in support of intracellular parasites in malignant tumours. The uncertainty as to the position of the bacteria in the active tumour evidently bears on the further hypothesis of Jensen that the bacteria may disappear, leaving the cells with the abnormal type of growth impressed upon them.

We thus come, as the real ground for comparing crown gall with malignant animal tumours, to the power of intrusion of the tumour tissue into the normal tissues of the plant and of there producing secondary tumours at a distance. The question of actual intrusion, as distinguished from extension of the morbid process to adjoining cells, requires critical reinvestigation. There is no doubt as to the existence of what have been termed secondary tumours, connected with the main tumour by a more slender strand of tumour tissue. It is by no means clear, however, in what sense or degree these represent intrusions, and a fuller explanation of their mode of origin is required, due allowance being made for the extension of the parts by growth from their condition at the time of infection.

One feature of the secondary tumours in the leaf on which stress has been laid is that they appear to repeat the structure characteristic of the stem, where the main tumour is situated. The radial arrangement of the vascular tissues in the secondary tumour and the tumour strand does not, however, appear to involve this interpretation. It cannot be taken as corresponding to the repetition of histological characters peculiar to the primary tumour in secondary malignant tumours in the animal body.

Crown gall, as one of the plant diseases most fully studied from this point of view, thus appears to bear out the apprehension expressed at the outset as to the soundness of detailed and direct comparisons between particular diseases in animals and plants. Doubtless, as our knowledge of normal protoplasm increases, and as pathological processes are traced back to changes in the cells and their protoplasm, fundamental common features of disease in plants and animals will become more and more evident. Though this aspect of the subject cannot be pursued here, it is of interest to note that Erwin Smith's studies of crown gall have led him to consider and experimentally attack such general underlying problems.

It will evidently be advantageous for a student of plant pathology to study some animal diseases, and conversely for a human pathologist to pay attention to some diseases of plants. Such studies must, however, always be conducted in the light of the differences in morphology and physiology which characterize animals and plants. The value of taking

plant diseases into consideration in human pathology (and in passing one may add of including some plant pathology in the education of the medical student) comes rather from this widening of outlook than in the form of direct inferences from the one subject to the other. To the philosophical human pathologist the study of some plant diseases may well be light-giving, and it is perhaps better not to expect it to be fruit-giving.

"*Et lucifera experimenta, non fructifera quaerenda.*"

DISCUSSION.

Sir CLIFFORD ALLBUTT said that he was ashamed to lay before the Section mere general considerations, in contrast with the solid results contributed by his expert colleagues. The President kindly called upon him to speak because he had taken a great interest in comparative pathology for many years. When President of the Section of Medicine, in 1882, he had pointed out the need of the Comparative Method in the study of disease; and again, in the Bute Hall of the Glasgow University, in the address on Medicine in 1888, he had urged the same message. At last, by the cordial co-operation of the President of this morning, the importance of the subject had not only been emphasized, but had also been fully vindicated, by the papers they had heard during the forenoon. Sir Clifford urged that no scientific subject could progress without the comparative method; history, philology, anatomy, physiology, etc.—even religion—owed much of their accumulated and systematized knowledge to the method. Outside the nosology of Man there were many workers—workers on the diseases of animals and of plants; therefore there was the less excuse for neglect of comparative methods by human nosologists. This supineness inflicted the same sterility upon the workers in other fields, such as veterinary medicine, plant pathology, and so on; each body of experts was working in isolation.

In his masterly paper Professor Lang had warned the students of Comparative Pathology against the snare of false analogies; but might not the adjective be left out? Arguing by analogies had been the bane of medicine from the earliest times. We had now to go beneath analogies and similitudes to underlying affinities, which indeed were often far from apparent. Even in the comparison of proper names—for example, surnames and names of places—we found every day the errors of derivation from appearances and analogies; when their history was traced in ancient records such derivations often proved to be false. We must be careful then in making direct cross-references, but rather trace genetic affinities from leaf to twig, to branch, to stem, until we reached a general view of the development of the processes concerned. It was true, as Professor Lang had said, that this method made us go a very long way back; but he had himself carried his striking comparisons back to a remote geological record. Furthermore, the biologist must be continually conversant with the properties of colloids, and so farther back again to physics with its laws of interface actions, adsorption, osmosis, and so on. We must seek for origins, however far back they may be. To take a simple modern and practical instance: Whence comes the healing virtue of cod-liver oil? As Dr. Hjort had shown, to find an answer we had to go back to certain marine algae which formed a part of the plankton on which fishes feed. It was in these lowly vegetables that the vital agents seemed to be created which gave their virtue to the oil that might be extracted from the livers of many fishes, but chiefly of the cod. The same result was seen in the virtue of the sprouting seed, of the pea, for instance, as contrasted with the impotence of its dry state.

Again, one of the mysteries of the animal body was the part played in metabolism by certain salts—by calcium, for example. The simplest forms of life might indicate the nature of this and of many other processes, which in highly developed animals were too entangled to be tracked out. The absence of a nervous system, and indeed of a definite circulatory system, might leave open to the observer the beginnings of the most essential principles or rudiments of vital processes. Thus the implicit capacity for fever could hardly emerge without the thermotaxy of a nervous system, whereby a local morbid change became subordinate to the balance of systemic forces. Our purpose was to detect the behaviour of protoplasm under an infinite variety of conditions, not here and there only, in several closed compartments. We knew, on physical, chemical, and biological grounds, how extremely slight were the structural differences which might issue in extremely different functions; as in adsorption, catalysis, chemical substitutions, immunities, and so on. When we got some command over such slight differences we should gain large powers over the perversions of molecular construction. A small rudder might control a very big ship. Morbid changes by no means always came about by gradual augmentation of differences, but by leaps and bounds, as musical flames fitfully responded to scales of vibration. Therefore clinical "Types" could form no basis for nosological classification. Besides, there was mimicry in disease, under which guises must be detected those processes which were alike at the core (αὐτοφυῶς ὅμοιοι). An internal change which converted a benignant or anabolic process into one of destructive malignancy might be very small; for instance, cacodylic acid, which was soluble and contained 70 per cent. of arsenic, was non-poisonous; and again, the non-poisonous cyanides and carbamides exhibited vital differences generated by slight molecular dislocations. Great secrets, then, might lie in the simpler play of uncomplicated principles, could we but get down to such conditions. As Professor Welch had said to the speaker in a recent letter, "we need a mode of research in which the first word shall be Comparison." But in such research we should be hampered if physicians would persist in supposing diseases to be "clinical (or other) entities"; they might as well attribute them to demons.

Of the tremendous importance of the study of diseases of animals or plants which were transmissible to man we had learnt much again from the contribution of Professor Hobday; into that utilitarian side of Comparative Pathology—pressing as it was—the speaker could not then enter; he had to keep to his own side—the research side—of the problems, a side on which he felt less incompetent to speak. He desired to insist upon the genetical, the historical, the geographical, the experimental methods. For there could be no complete system of therapeutics until the science of Comparative Nosology—a science as yet hardly recognized—until the genetic affinities of diseases, their origins, parent stems and alliances, as well as their issues, were worked out.

Note.—These reflections were subject to exceptions, such as the brilliant work of Sir John Bland-Sutton (*Introduction to General Pathology*, etc.) and of a few others. Some passages of the present argument were quoted from the speaker's two former addresses.

Professor S. H. GAIGER (Glasgow) said: Professor Hobday's list of animal diseases communicable to man is sufficiently long without any additions, but to it there can be added certain of the African trypanosomiases where the rôle of animals in the spread of the human disease has been much discussed in recent years. It is questionable whether in his list there should have been mentioned as a possible danger to human beings the *Bacillus abortus*; more probable is it that it should have been left out. It is a matter for much satisfaction that science has shown the method by which glanders and rabies can be stamped out. The recent outbreak of rabies in this country shows clearly that the advice of the veterinarian with regard to visitations of disease is infinitely preferable to the advice of the lay administrator. The country has to buy its experience in such matters, and if the recent outbreak of rabies with its 179 persons bitten has taught Britain this fact it was worth it. Animal diseases cannot be got rid of in Britain without a knowledge of veterinary pathology any more than human diseases can be combated without a knowledge of the pathology of human diseases. Though glanders and rabies are practically stamped out in Britain they are rampant in many other countries, including some countries within the British Empire. In the case of anthrax we are dealing with a more insidious disease. The causal organism is a sporulating one, and therefore capable of living for presumably indefinite periods apart from the animal body. Official control of such a disease lessens the risk of bacterial multiplication from actual cases of anthrax, but at present gives no protection against spores brought in animal products from abroad. There is no doubt that progress against anthrax will be slow but sure, and that concerted action will in time eradicate the disease. It is not lack of pathological knowledge that prevents the eradication of bovine tuberculosis. We have a reliable diagnostic agent in tuberculin, and we are dealing with a non-sporulating organism which cannot live indefinitely away from the animal body. We have all the means at our disposal to enable us to stamp out tubercle from our herds except funds and organization to allow us to carry on. The matter is a very serious one, but only a spasmodic effort or two is being made

at present instead of the necessary campaign. The tubercle bacillus makes no spasmodic effort, it is war spread broadcast, and measures to cope with it must be correspondingly extensive.

The medical man and the veterinarian can both derive great benefit from the study of comparative pathology apart from the communicable diseases. Take, for example, diseases caused by the pathogenic anaerobes in man and animals. Up to the war period the position of our knowledge of these infections was one of almost hopeless confusion. None knew what really was the correct account of the biological characters of any pathogenic anaerobe. Some gave their descriptions from pure cultures, others from impure cultures, and the impurities were by no means always the same. The war period brought with it the necessity for the study of wound infections. We were found totally unprepared for the specific treatment of gas gangrene, and prior to making antiserums for the treatment of this condition it was necessary to suffer delays from the indispensable preliminary bacteriological study of the causal organisms. This delay meant the loss of many valuable lives. It has fallen to me in the last few years to investigate certain anaerobic infections in animals, and particularly braxy in sheep. Braxy is an example in animals of a pure infection with an anaerobe. It is true it is not a skin-wound infection. It is a stomach-wound infection, not a wound in the usually accepted sense of the term but an injury from the lowering of the tissue defences from chills, from frosted food, etc., and the anaerobe is enabled to gain entrance. It invades the system in pure culture. Bacteriologists studying gas gangrene spent much time purifying the anaerobes from that condition, and one way they did so was by passage of the bacilli through the animal body; yet here in braxy in the sheep, had it been known, was to be found one of the most important of the gas gangrene organisms invading the system in pure culture from the stomach, leaving other anaerobes and aerobes behind. It is, in fact, a natural purification of this bacillus by animal passage, but no one knew of it. I believe that time is going to show the pathogenic anaerobes to be of vast importance to the veterinarian. My investigations into braxy will be published in a few weeks, but that is only one instance. There are others. In peace time anaerobic infections in wounds in man are negligible in number. In war time it is quite the reverse. In animals many do not yet realize the extent of such infections. Had a thorough knowledge of anaerobic infections in animals been available before 1914 the medical scientist would have been greatly helped and serum treatment would have been available early in the war instead of just as the war was closing. As it is, the veterinary pathologist has been greatly assisted by the war-time studies of the human pathologist. Let us hope that the day is not very far distant when veterinary research in Britain will be directed by a Veterinary Research Committee, after the manner in which research into human diseases has been so ably assisted by the Medical Research Council.

Mr. William B. Brierley (Rothamsted Experiment Station) said: May I state at once that I agree fully with the greater part of what Professor Lang has said? The unbridgeable gulf between the morphology, anatomy, and physiological processes of animals and plants resulting from the complete divergence in their evolutionary sequences must be recognized. There is in animals nothing comparable with the rigid-walled cells of plants, and in plants nothing comparable with the blood vascular system, the lymphatic, alimentary, nervous, muscular, and skeletal systems. It is these characteristic features that give rise to and make possible the specific pathological responses associated with disease. Occasionally interesting but purely superficial general parallels exist, but to find exact analogies in development and structure, and even more to trace exact correspondences in the details of the morbid histology of diseased host tissues of animals and plants, and to reason from one to the other is to falsify and confuse every issue. These differences are fundamental, and comparative investigations can only have value if they are borne acutely in mind. Within recent years detailed comparisons have been made between that very remarkable disease of plants, crown gall, and malignant animal tumour. Professor Lang has indicated that in his view this comparison, except along the most generalized lines, must be regarded with much circumspection, and on the whole I would associate myself with Professor Lang. One point on which, however, I would definitely reserve my opinion is whether the tumour strand is an infiltrative tissue. I have had the very great privilege of examining many of the wonderful series of specimens and preparations of Dr. Erwin F. Smith, to whom we owe all our knowledge of crown gall, and as I remember the microscopic appearances I find it difficult in certain cases to interpret the development of the tumour strand as other than an infiltration into foreign tissue. Secondly, Professor Lang referred to the absence of infiltrative development in the case of Jensen's beet tumour grafts. Their absence here would not appear to me to be conclusive, for I think that on the whole such developments are hardly to be expected in such complexes. The conclusion to which I am drawn from a comparative review of diseased states in anima's and plants is that as regards the host tissue responses there is little if anything in common save the most general reaction of wound healing. There are, however, many other aspects of pathology, and I wish to spend a few minutes dealing with certain of these.

As in animals and man, so in plants many diseased states are due to the operation of environmental factors, such as malnutrition, light, temperature, humidity, specific toxic agents, and so forth. Is it here that we shall find greater scope for comparative studies and more exact and detailed analogies? A broad survey of the evidence does not lend hopeful augury, and save in the most generalized pathological reactions and perhaps in regions of protoplasmic response and cell chemistry, to which we have as yet hardly penetrated, the two kingdoms appear to be remote from each other. Most of the diseases, however, to which we, as pathologists, direct our attention are caused by living parasites—bacteria, fungi, protozoa, myxomycetes, helminths, and arthropods of various sorts. I will say at once that it seems to me that it is in the comparative study of these organisms that animal and plant pathologists find their most intimate and real contact, for it is only in the full understanding of the causes that the rational control of the effects can be brought about and a solid foundation laid for future progress. May I in a few words indicate what are to me the most salient aspects of this point of intimate contact?

A knowledge of the structure of any particular pathogen and of related types is essential as a basis for classification and nomenclature. It is surely evident that where animal and plant pathologists are dealing with like groups, common genera, and occasionally even with the same species, that similar systems should be adopted, comparative studies made and the results pooled.

Again, related species frequently have similar developmental phases in their life cycles, and as wide and intensive a knowledge of life histories as possible is a fundamental part of the mental equipment of any pathologist. If life history studies are to have any real value they must be comparative.

A third aspect in which the value of comparative investigation seems to me so obvious as scarcely to need comment is in regard to the physiological qualities of pathogens. All problems of virulence, of disinfection, of invasive power by enzymatic or mechanical action, of physiological classifications and so forth, are essentially the common ground of both animal and plant pathologists. The fact, for example, that bacteria commonly found in the soil can oxidize phenol and cresol is of vital importance to the animal pathologist.

A fourth and very important aspect of study which can only be carried out in a comparative way is that of the genetics of micro-organisms. Problems of adaptability, modification, and mutation, the scope and permanence of these changes and their relation to the immunity, resistance, or susceptibility of specific host tissues is vital and common ground to all microbiologists. Perhaps I may be allowed to illustrate by one example. Physiological classification is based on an assumption of the permanence of certain physiological qualities; vaccine and serum therapy is based on an assumption that certain physiological qualities can be permanently changed; breeding for disease resistance is based on an assumption that certain physiological qualities are unchangeable and so forth.

A further aspect of very great comparative interest is in the geographical distribution of micro-organisms. Very little is yet known of this subject, but it presents undoubtedly a very wide and deep field for comparative study. An aspect of pathology which, from the animal point of view, is very difficult of direct experimentation concerns epidemiology. This is an easy and almost untouched field in plant pathology. It is, however, obviously a comparatively simple matter to study

problems of the dispersion of any particular pathogenic organism among a hundred or a thousand individuals of wheat or tomatoes, etc., under standardized and controllable conditions. It would not be easy to carry out such experiments on animals or man. Finally, all pathologists, whether of the plant, medical, or veterinarian persuasions, are dealing essentially with the same groups of organisms and using the same methods. Advances in laboratory apparatus and technique made by animal pathologists are applicable in botanical or veterinary laboratories and conversely.

Perhaps I have occupied overmuch time with this summary, brief though it be. When, however, one realizes the great gulf between veterinarians, medical men, and botanists and agriculturists, and the great masses of knowledge which are of vital interest to all, and should be common to all, and yet which are unknown to those not actively working in this or that particular field, I do not think I am unjustified. One aspect of disease in plants which is daily growing in importance concerns that little understood group known as "virus" diseases. A later speaker will deal in detail with this, but I wish to say a very few words on the subject. Viruses and filter passers are now well known in both animal and plant pathology, and in the latter division there is a series of hitherto unrelated diseases passing under various names which undoubtedly belong here. The host responses of plants have little in common with those of animals save that in both divisions the "carrier" problem is present. Recent investigations of certain mosaic diseases would appear to indicate that bodies similar to Rickettsia and to the well-known Negri bodies may be found in the diseased tissues. Many of these virus diseases have proved to be carried by insects (although with others this is not necessary), and in the disease known as curly-top of sugar beet there are indications that the virus passes through a developmental life cycle, one moiety taking place in the insect, the other in the plant. In any case the vital comparative interest of these diseases must be patent to all.

In conclusion, I would like to make a plea for the definite recognition of a science of medical mycology similar to that accorded to medical entomology. Only a very few years ago entomologists were not regarded seriously in medical science. What might almost be regarded as a series of lucky accidents brought entomology into the very front line of medical research, and led to the recognition of medical entomology as a definite science of primary status. University chairs were founded, opportunities for research and teaching were given, and the value that has resulted is incalculable. Equally necessary is the recognition of medical mycology with similar opportunities for research and teaching. Medical mycology would give scope for that intimate contact between veterinarians, medical men, botanists, and agricultural bacteriologists, and one might even hope that thereafter the fungi pathogenic to animals and man would receive adequate and critical study. I venture to think that the first university or medical institution founding a research and teaching school of medical mycology will have taken a vast forward step in medical science.

May I in a few words summarize the points that I have wished to make? There is little that can be helpful, and there are great possibilities of confusion in making detailed comparisons of host tissue responses in plant and animal diseases. There is a vast field for common study of the great groups of micro-organisms. There is much need for common meeting grounds and the utmost value can be obtained from an intimate exchange of facts and points of view. There is vital need for the recognition of a science of medical mycology, and this meeting would be memorable if it led to such a foundation.

SOME CHARACTERISTICS OF THE VIRUS DISEASES OF PLANTS.

BY

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The diseases of plants caused by an ultramicroscopic agent or virus appear to fall into four main classes. The largest is the group to which the mosaic disease of tobacco, first shown to be caused by a filtrable virus in 1892, belongs. The diseases in this group can be transmitted to healthy plants by grafting, in most cases (perhaps always) by sucking insects, usually by inoculating with the expressed juice or crushed tissues, and occasionally through the seed. There are no definite necrotic lesions, except in rare cases where necrosis of the parenchyma cells has been observed. They are not usually fatal, though often very harmful.

A second, small, group consists of diseases of which peach yellows is the type. Transmission has only been effected by grafting, but natural infection takes place in some unknown way, perhaps by insects. Transmission by inoculation with the juice or crushed tissues or by the seed has not been accomplished. No specific necrotic lesions are caused, but the cases are fatal.

A third group comprises the forms of variegation which can be transmitted to normal green plants by grafting. The affected plants are somewhat less resistant to unfavourable conditions than those that are normal, but the disease (if disease it can be called) is of a very mild type. Natural infection is not known.

Finally, there is a small group resembling the mosaic diseases in many respects, but characterized by definite necrotic lesions in that part of the vascular strands through which the elaborated food is conveyed to the growing or storage parts—the phloem. This group can be transmitted by grafting and also in some cases by insects, but not, so far as is known, by juice inoculations or through seed.

Transmission.

In all the cases investigated transmission can be effected by causing organic union between the tissues of a diseased and healthy plant, as by grafting or budding. In no case is mere contact sufficient. The next most generalized method is transmission by insects, this being common in the mosaic and phloem-necrosis groups, and possible, though not proven, in the peach yellows type. Transmission by inoculating with the juice of infected plants is only certainly known to occur in the mosaic group (much the largest). Transmission through the seed is rare, but has been fully established in certain mosaic diseases.

In transmission by grafting not every variety of plant that can be successfully grafted can be infected, though some of these diseases have a wide range of hosts. Sometimes, also, the virus is transmitted, but the new host shows no symptoms other than the ability to transmit the disease with full virulence by grafting on a susceptible host. Thus the phenomena of immunity and of "carriers" are known.

In transmission by insects usually there is no evidence that the insect is a necessary secondary host. Infection will occur if the insect is placed on a healthy plant immediately after feeding. In the "curly-top" disease of beet, however, infection cannot be conveyed for some time after feeding (four hours at high temperatures, up to forty-eight hours at lower temperatures). There is some evidence (as in several other allied diseases) that the infective agent is not always taken up with the plant juices by the insect, possibly because it is not always in a stage accessible to the latter. No other method of transmission than by the insect (*Eutettix tenella*) and by grafting is known. Evidently the causal agent must be an organism possessing a definite life history in host-plant and insect.

Spinach blight can be transmitted by several different insects and by juice inoculations. The incubation period in the plant varies according to the age of the plant and of the insect transmitter. The infective agent is hereditary in the insect up to at least four generations. The juice of infective aphids is infectious.

Transmission by inoculation with juice or crushed tissue has been most fully studied in the tobacco mosaic. The virus is present in all parts of the plant except the embryo of the seed. Infection can be produced by inoculating any part of the plant after abrading the cuticle. The leaf hairs of infected plants contain the virus, and it can be inoculated successfully by merely cutting first infected hairs and then those of a healthy plant with fine scissors. *Nicotiana viscosa* is immune to the mosaic of common tobacco (*N. tabacum*) but has a mosaic of its own, and both diseases will infect *Datura stramonium*. Carrier species are known—for example, *Physalis* can transmit the disease without showing any symptoms. Some species of aphids transmit readily, others fail though they feed and multiply on the plant.

In many mosaics the crushed plant tissue is more infective than the juice, but insects are often better than either. In some the virus is limited in distribution, and does not reach the root, for instance. In a few cases biting insects (for instance, *Diabrotica* beetles) can carry infection.

Passage of the Virus within the Plant.

There is a good deal of evidence that the virus is conveyed chiefly through the phloem. This is practically the only tissue that shows necrosis in certain of these diseases. The most usual transmitting insects are aphids, and it is now known that many of these feed chiefly or exclusively by sucking the juices from the phloem. Translocation of starch (effected through the phloem) is impeded in several virus diseases. Removing the bark (including the phloem) around the shoots prevents the passage of the virus in the infectious chloroses. The failure to reach the embryo, which is such a marked character of many of these diseases, may be explained by the fact that the vascular strands terminate in the integuments and do not reach the embryo, which is nourished by osmosis from the tissues outside the embryo sac. In the cucurbits, in which mosaic is transmitted by the seed, there are special nutritive adaptations for feeding the embryo which may serve to explain its infection.

The passage of the virus is slow in the tobacco mosaic, where it may take over three days to traverse a leaf and its stalk. In cucumber mosaic a case is recorded where it took nine hours for the virus to traverse thirty inches of stem in an upward direction.

In the infectious chloroses there is evidence that though the virus may be distributed throughout the plant it only multiplies in the chlorotic areas. If these are removed the plant will ultimately give normal green leaves. But the virus persists in a latent condition in the dormant buds of such plants, and if these are forced into growth they give chlorotic shoots which reinfect the new growth of the whole plant.

Properties of the Virus.

The virus of tobacco mosaic filters through most porous filters. In one case filtration through the Chamberland filter gave 91 per cent. infection, through the Berkefeld normal 63 per cent., the Berkefeld fine 47 per cent., and the Kitasato 40 per cent. It is retained by the Livingstone atmometer porous cup and by seven-eighths of an inch of powdered talc. The whole of the virus in infective juice is carried down with the precipitate from 45 to 50 per cent. alcohol or with an aluminium hydroxide precipitate, without losing infectivity. Antiseptics give irregular results, mercuric chloride being sometimes less effective than copper sulphate for instance. Heating to 70° C. destroys the infectivity of some viruses, others may survive 90° C. Dried infective leaves may retain 100 per cent. virulence after three years, and bottled juice up to fifteen months, even when it putrefies. Evaporated juice is less resistant. Dilution to 1 in 1,000 does not reduce the infectivity, and 1 in 10,000 does not destroy it. Cucurbit mosaic virus is much less resistant than that of tobacco mosaic, and may not survive keeping for even a couple of days.

The optimum temperature for the activity of the tobacco mosaic virus, as judged by the length of the incubation period, is 28° to 30° C. and the maximum near 36°. No symptoms appear when cooled sufficiently to check growth of the plant or heated above 36°, but they reappear when normal temperatures are again used. In certain areas in Canada infected potato plants show no symptoms and give almost normal yields, so that climate may make a plant become a "carrier" of its own virus.

Only quite recently have bodies that may possibly be organisms been definitely observed in the cells of infected tissues. In the maize mosaic and that of *Hippeastrum*, Kunkel of Hawaii has seen bodies which he compares with the Negri bodies of rabies or with *Cytoryctes variolae*, but which from his figures also resemble Rickettsia in certain stages. In tobacco mosaic, Palm of Java has just reported the presence of bodies agreeing in every respect with Lipschütz's "Strongyloplasma" or the "Elementarkörperchen" of v. Prowazek, and in another form with Guarnieri's bodies (Cytoryctes). Neither author refers to Rickettsia, but there would seem to be evident resemblances.

Though the first demonstration that disease can be caused by a filtrable virus was made in a plant disease—tobacco mosaic—human pathologists have advanced the study of the possible causative agents beyond the stage reached by plant pathologists. The latter may, however, claim to have been among the earliest to have convicted insects of playing a primary part in natural infection; they have proved that these diseases can be hereditary in host-plant and in insect; and on the experimental side, owing to the naturally greater ease of experimenting with plants, have made them amongst the best known diseases. They have shown that the plant cuticle presents an impassable barrier to infection; that a saprophytic life of the organisms is highly improbable; and that they are often so closely associated in some way with the living tissues that infection is only possible when organic union between diseased and healthy tissues is effected. Finally, they are demonstrating the remarkable effect of the environment, especially temperature, on the course of some of these diseases.

DISEASE RESISTANCE IN PLANTS.

BY

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As in human beings, many diseases of plants are caused by parasitic organisms, but whereas in man the parasites are chiefly bacteria and protozoa, in plants most pathogenic agents are fungi. Among men and women great differences in susceptibility to various diseases are manifest, and there are in most of us individual diversities or idiosyncrasies as regards reaction to disease. This is perhaps an expression of the much greater complexity of organization in man than in even the most highly developed plants. In plants of the same kind these individual differences as regards disease are much more obscure, and probably do not exist to anything like the same extent as in man. Thus two wheat plants under uniform soil conditions in the same field will react to attacks of rust fungi in identical fashion. On the other hand, all cultivated plants exist in innumerable races, and these do show marked differences in susceptibility to specific diseases. These races of cultivated plants are perhaps comparable genetically to the races of mankind, so that the difference in degree of attack by rust exhibited by two kinds of wheat may be compared with a differing susceptibility to some common malady exhibited by the white and the negro races; the genetic constitution of man, however, is so much more complex than that of the higher plants that a strict parallel cannot be drawn.

It is a matter of common observation to cultivators that different varieties of the same cultivated plant show marked differences in the power of resisting certain parasitic diseases. Thus one kind of rose will be badly attacked by mildew and another closely related variety, growing under the same conditions, will remain practically free from attack. Again, one kind of apple tree will show extreme liability to canker, while another, side by side with it, will remain entirely free from this disease. There must clearly be some constitutional or genetic difference between these closely related plants to account for such phenomena.

As to the actual causes of the immunity or marked degree of resistance to disease in such plants we know as yet very little, although inklings of the truth have been discovered in certain directions. It is already known that much of this so-called immunity is really disease escape—that is, through some slight structural peculiarity or divergence in mode of life on the part of the host, the germs of disease are unable to establish themselves therein, with the consequence that ill health is avoided. In such plants there is no active resistance to parasitic attack. Thus it has been shown in America that if a tomato fruit has a skin which is strongly cuticularized it remains free from attack by the fungus *Macrosporium tomato*, whereas if the cuticle be thin the fruit is readily attacked. Structural differences of this kind also often account for a fungus attacking one part of a plant and not another. Thus the petals of flowers readily fall a prey to the spores of *Botrytis cinerea* under moist conditions, whereas healthy green leaves of the same plant in the same environment remain unaffected by these spores. This is partly because the petals, having practically no cuticle, allow of the exosmosis of nutritive substances to the fungus from the interior of the host, thereby causing stronger growth, and partly because the thinner cuticle is a less efficient barrier to the fungus than in the leaf. Another example of disease escape is shown by early varieties of potatoes, which in this country are usually free from attack by blight. It is not that these varieties are immune to the fungus *Phytophthora infestans;* they remain free from disease because they mature before spores of the blight fungus are available to cause infection. Again, early or late sowing may enable cereals to escape certain smut diseases which infect the seedlings, because of the different temperature conditions favourable to host and parasite respectively.

A specific example of the profound effect of the influence of temperature upon the incidence of a plant disease may be given. In the northern part of the United States a certain smut fungus, *Urocystis cepulae*, causes a common and serious disease of the onion, whereas in the southern States the disease is unknown, although the same varieties of onion are grown. The factor determining this difference in the occurrence of disease is the soil temperature, it having been shown that a temperature of 29° C. and above during the critical period of growth completely inhibits infection.

On the other hand, the host does sometimes actively resist penetration by a parasitic fungus, and there is definite knowledge of some of the phenomena accompanying this resistance in certain of the rust fungi which attack cereals. Sometimes the rust fungus attacks the host so feebly that haustoria—the absorbent suckers of the fungus—cannot be established in the host cells, so that the parasite quickly dies. In other cases the parasite attacks the host so vigorously as to kill the cells in its immediate vicinity; in this way the fungus surrounds itself with a barrier of dead cells which it is unable to penetrate, for in the rust fungi it is only when a quasi-symbiosis is established with the host that the parasite flourishes. In the latter example the immunity to attack is really due to the parasite attacking initially so vigorously as to defeat its own object. Immunity of this kind is sometimes said to be due to a hypersensitiveness on the part of the host. This phenomenon is by no means rare in cereals, and most of the varieties of wheat immune to rust attack owe their immunity to this hypersensitiveness. Again, with some varieties of cereals practically immune to mildew (*Erysiphe graminis*) the resistance can be broken down by reducing the vitality of the host—for example, by subjecting the leaves to the vapour of chloroform or ether.

If closely related varieties of wheat, one of which is susceptible and the other immune to yellow rust, are hybridized, it has been shown recently by Biffen and others that susceptibility and immunity behave as a pair of Mendelian allelomorphic characters segregating sharply from one another in the second and subsequent generations. In this example susceptibility is dominant to immunity, but with other parasitic fungi there is evidence that immunity may be dominant to susceptibility. Apart from certain diseases, such as colour-blindness and haemophilia, which are sex-linked in their inheritance, I know of no human diseases, certainly none of parasitic origin, susceptibility to which is transmitted hereditarily according to Mendel's law. It may be that in man susceptibility to disease depends upon a multiplicity of factors in the Mendelian sense, whereas in the above examples taken from plants only a single factor appears to be involved.

In this connexion it must be pointed out that the interactions of host and parasite resulting in immunity are purely local in effect, and any antibodies formed during the struggle are not transmitted to other parts of the plant, there to confer immunity. With few exceptions parasitic attack in plants is relatively localized, the parasite only gradually enlarging its domain by progressive advancement. In the higher plants there is nothing comparable with the blood stream of vertebrates, the circulation of sap being essentially different in important respects; hence antibodies formed in response to parasitic attack in one part are not readily carried to other parts. On the other hand, fungi inhabiting the vascular systems of plants sometimes secrete toxic substances which, carried in the sap, cause death in distant parts.

Although susceptibility and immunity to certain plant diseases are phenomena of genetic significance, it is clear from recent investigations that the expression of the genetic factor may be modified by environmental influences. Thus a wheat genetically immune or highly resistant to yellow rust may, under certain abnormal weather conditions, become quite susceptible to this parasite, but this is only an illustration of the fact that organisms in general are the result of hereditary tendencies moulded by environment. The environmental factor is, however, of particular significance as regards the incidence of plant diseases. Unlike human beings, who, within certain limits, can control their environment, plants are relatively passive and cannot control the conditions under which they live. To give one illustration: the internal temperature of man is practically constant, whatever the weather may be, whereas a plant possesses very little power of controlling its internal temperature, this being almost entirely dependent upon external conditions. One is not surprised, therefore, to learn that plants genetically highly resistant to certain diseases fall a prey to these troubles under abnormal conditions. A few examples of this breaking down of the resistance of the host may be given. The variety of wheat known as Einkorn is entirely immune to attacks of black rust under normal climatic conditions, but during the height of the hot spell in the plains of northern India it readily falls a prey to this fungus disease. Again, agricultural experience shows that crops in general become more susceptible to fungoid disease when manured excessively with nitrogen; on the other hand, heavy manuring with potash tends to confer an additional degree of resistance to disease. Simple changes of this kind obviously exert some modifying influence upon the host protoplasm which leads to alterations in the incidence of disease. Another example illustrates a phenomenon of a more obscure nature. As is well known, commercial varieties of apples are usually grafted upon a stock of a somewhat different nature. One of the most commonly grown varieties of apples, Bramley Seedling, is almost entirely immune to the disease known as apple canker when grafted upon most kinds of stocks, but when grafted upon one particular type of stock it is so badly attacked by this disease as to be commercially worthless. There is as yet no explanation for this remarkable change.

Generally in plant diseases there is no such thing as unmodifiable immunity. In plant pathology one deals rather with examples of high resistance than with absolute immunity, and it has been pointed out that a pronounced degree of resistance may be altered to some extent by environmental influences. But there is one plant disease, and it happens to be one of serious importance in this country, in which the immunity of certain races is absolute, and, as far as is known, entirely unchanged under all conditions of environment. I refer to wart disease of potatoes due to the fungus *Synchytrium endobioticum*, which causes the tubers to proliferate into monstrous growths. There are some varieties of potatoes which are absolutely immune to this disease under all conditions, while others show differing degrees of susceptibility. Unfortunately it is not yet known why some varieties exhibit this clean-cut immunity, but as investigations are proceeding in this matter it is hoped that light will soon be thrown upon it.

Another difference between animal and plant pathology lies in the fact that no examples are known in plant pathology of the conferring of artificial immunity by inoculation of a susceptible plant with a weak strain of an otherwise virulent parasite. As mentioned above, parasitic attack in plants is usually localized, and there is no mechanism for the circulation of any antibodies which may be produced in consequence of this attack to other parts of the host plant. Plants attacked by parasitic diseases not infrequently recover, but this is no guarantee against attack again in the immediate future. Thus a plum tree suffering from silver-leaf disease caused by the fungus *Stereum purpureum* may completely recover, and then, upon this fungus being introduced again by inoculation, will readily become affected a second time.

Many plant diseases are due to a class of fungi known as wound parasites. These are peculiar in their mode of life in that they cannot infect living tissues directly, but only via dead cells. Many tree-destroying fungi are of this class. For example, one of the commonest bracket fungi, *Polyporus squamosus*, which frequently kills elm trees, is only capable of causing infection if its spores alight upon some exposed wound. The fungus, therefore, begins its life as a saprophyte and passes to the interior of the tree where all the cells are dead, still maintaining its life completely as a saprophyte. In its capacity as a saprophyte it may cause grave damage to the tree, rotting the central wood of the trunk, so that loss of rigidity may cause the tree to be blown over in a high wind. It is only after long existence as a saprophyte that *Polyporus squamosus* begins to attack the living cells of the sap-wood of its victims, when, of course, it is acting as a parasite. The higher plants frequently contain much more dead tissue proportionally than the higher animals, and with these wound parasites the actual damage inflicted on the host often concerns the dead tissues more than the living. It is impossible to speak of active disease resistance by dead tissues, although there is often exhibited a passive disease resistance, dependent upon such factors as the texture of the wood, its air content, and its chemical composition.

Where the degree of disease resistance to specific wound parasites of closely related plants differs greatly it is not yet known how much of this resistance is due to active opposition on the part of the protoplasm and how much to passive resistance dependent upon the factors mentioned above. With a wound parasite such as *Stereum purpureum*, the

cause of silver-leaf disease in fruit trees, marked differences in susceptibility are shown by closely related varieties. Thus the Victoria variety of plum is very susceptible to this disease, while the variety Pershore is rarely affected by it. Although these differences in susceptibility to disease are just as marked with wound parasites as with obligate parasites such as rust fungi, the explanation of relative immunity is probably of a considerably different nature in the two categories.

Finally, it need scarcely be pointed out to pathologists that, in plants as in man, resistance to one particular kind of disease does not imply resistance to other diseases.

PERSISTENT EOSINOPHILIA WITH SPLENOMEGALY.*

BY

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[*With Special Plate.*]

During the past year we have had under observation a case of persistent eosinophilia, associated with a high total leucocyte count and marked splenomegaly. The condition, so far as we can determine from the literature at our disposal, appears to be extremely rare. We have only found records of two similar cases, both in America. The present case is still under observation, and, though we have come to no final conclusion as to the etiology and nature of the condition, we have thought it worth while to record the case in the hope that others who may have observed the condition will publish their results.

As splenectomy was performed with marked improvement in the patient's physical condition, the case may have some special interest at present in view of the modern tendency to remove the spleen in cases of various "blood diseases" of unknown or uncertain origin. The existence of such a high degree of an eosinophilic leucocytosis has also given us an opportunity of making some observations on the phagocytic capacity of the eosinophiles and on the relationship of the eosinophile cells to the formation of Charcot-Leyden crystals.

Clinical History of the Case.

The patient, J. H., was admitted to the Royal Victoria Infirmary, Newcastle-upon-Tyne, on July 14th, 1921. We are much indebted to Mr. A. M. Martin (under whose care the case was admitted) for permission to publish the case, and for the use of the clinical records; we are also much obliged to Dr. Philip of Morpeth, who has kept us in touch with the patient since the operation. The patient on admission gave the following history:

For the last seven years he had been troubled with vomiting in the morning, but this had not interfered with his work, at which he had continued till the day of admission. His occupation is that of a hedger and ditcher, and his work being outside he had been constantly exposed to "all sorts of weather." He has never had any serious illness and has never had occasion to consult a doctor till now. He is 46 years of age. His family history is perfect; father and mother are alive and well; he is married, and his children are all healthy. He has always been rather a small eater, taking very little meat and living mainly on bacon and eggs. He is rather a spare, lightly built man, and his normal weight is about 10 stone. Beyond some slight indigestion and flatulence he states that he had nothing to complain of, but on being questioned he admitted to having felt rather done up lately, and being conscious of loss of weight he consulted his doctor five days before admission.

Dr. Philip on examination found an abdominal tumour, and this, coupled with the loss of weight and some gastric symptoms, suggested a possible malignant growth. He was recommended for admission to hospital under Mr. Martin.

On admission on July 14th, 1921, he was found to be suffering from an enlarged spleen; there was no pain. He looked in very poor condition, and was obviously ill. Careful physical examination, however, revealed very little. His weight was only 8 stone. There were no enlarged glands, and but for the splenomegaly and a marked blood change there was nothing of importance to note. A blood examination (see Table I) showed a leucocytosis of 34,000 per c.mm., and a differential count gave a very high percentage of eosinophiles (71.4 per cent.). There was only a slight degree of secondary anaemia. The blood picture did not in the least suggest an ordinary leukaemic condition, and, though there was no evidence of a parasitic cause, the possibility of a hydatid infection was suggested, and Mr. Martin explored the abdomen on July 29th, 1921. Finding a freely movable spleen with no adhesions, he performed splenectomy. The liver looked normal and was not enlarged. No special difficulty was experienced; there was very little haemorrhage, and the patient made an uninterrupted recovery from the operation.

The details of the subsequent blood examinations will be given later, but it may be briefly stated that since the operation there has been an increasing leucocytosis, rising in December, 1921, to 92,800 per c.mm.; the percentage of eosinophiles has remained fairly constant and has risen now to 82 per cent. Together with this there was steady improvement in the patient's physical condition. He left the hospital with a soundly healed scar on August 27th, 1921. He returned again on November 10th, and stated that he was much better and was already able to do some light work; there was no enlargement of the liver and no enlargement of lymph glands.

He returned again to the hospital for examination on December 15th, and said that "he was almost himself again." He had been doing a full day's work for the past six weeks. His weight was restored to 10 stone. On examination it was noted that there was no enlargement of the liver, but there were a few moderately enlarged glands present in the posterior triangle of the neck on the left side and one similar gland above the inner third of the right clavicle. Very slightly enlarged glands could be detected at the apices of both axillae, but the occipital, epitrochlear, and inguinal groups could not be detected.

In order to report progress for the purposes of this paper he returned for a further examination on June 29th, 1922. He stated that he had not missed a day's work since he left hospital in December. His appearance, however, did not bear out his statement that he felt quite well. He was thin and pinched-looking; his weight was only 8 st. 11 lb. He said that he had an influenzal cold in February, but continued to work; up till May he had a succession of slight "colds" and felt very tired at times. He seems to have had "rheumatic" pains in his limbs and the soles of his feet. There had been no return of stomach trouble, and for the past three weeks he had felt very well indeed. On examination the glandular enlargement was as in December, 1921. There was distinct deterioration in the blood condition (see Table I); there was albuminuria with casts, granular and epithelial, and some red blood cells and leucocytes in the centrifugalized deposit; no eosinophiles were detected. The faeces were examined microscopically on six occasions during the year, and no evidence of parasitic invasion of the alimentary canal was found. The general impression conveyed was that he was distinctly failing.

Blood.

Examination of stained films before operation (July 16th, 1921) showed a considerable degree of anisocytosis and poikilocytosis. There was also a slight degree of polychromatophilia and an occasional red cell with punctate basophilia. No special abnormality was noted on the part of the blood platelets; an occasional nucleated red cell was observed. The only striking alteration in the blood picture was the great number of eosinophilic leucocytes (see Table I, B). The majority of the eosinophiles appeared to be larger than normal, though some were distinctly smaller. The nuclei appeared, on the whole, to be distinctly more lobulated than normally. A differential count of 300 eosinophiles with reference to the degree of lobulation of the nucleus was made on each occasion when the blood was examined, and the results are seen in Table II. Eosinophilic myelocytes appeared to be smaller in size than normally and only constituted 0.7 per cent. of the total count. The granules in all the eosinophilic cells were fairly uniform in size; in the case of a few cells they seemed to take the stain less intensely. In the five subsequent blood examinations following the splenectomy the above observations were generally confirmed; some exceptions, however, are to be noted.

As regards the red cells, there was a distinct rise in the number of nucleated forms (see Table I, B). In the last two examinations megaloblasts were present in an appreciable amount; in the last examination there appeared to be a slight increase in the average diameter of the red cells and blood platelets seemed to be more scanty. From August 17th, 1921, it will be observed (Table I) that there is a steady diminution in the number of the red cells. In the last examination (June 29th, 1922) the diminution was still more marked. A fragility test for the red blood corpuscles made on December 16th, 1921, showed no abnormality. The coagulation time, as estimated by Boggs's coagulometer, was three and a half minutes, compared with four and a half minutes in a control. As regards the leucocytes, it will be observed from Table I that there was a steady and considerable rise in the numbers up to December 15th, 1921, when the highest count—namely, 92,800—was reached; there is, however, a slight fall in the last count (June 29th, 1922).

An examination of the differential counts shows on the whole a gradual fall in the percentage of polymorphs, with a corresponding increase in the lymphocytes—possibly the result of the splenectomy. The percentage of large mononuclears and basophiles has remained almost constant. The percentage of eosinophiles has remained much the same throughout, though it may be noted that the highest figure obtained (82 per cent.) was found in the last examination. As regards the percentage of eosinophilic myelocytes, it will be noted that it has always been small and distinctly uniform—usually about 1 per cent. On one occasion only did it reach 2.7 per cent.

An examination of films made at various times since splenectomy shows on the whole distinct uniformity, and the following points may be noted: The eosinophiles appeared to be less fragile than normally, and ruptured cells were comparatively rare. They

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TABLE I.—*Blood Examination of a Case of Eosinophilia with Splenomegaly.* (*Splenectomy was performed on July 29th, 1921.*)

Date.	A. Blood Count. Red Cells.	White Cells.	Hb.	Colour Index.	B. Differential Count (based on 300 leucocytes).† Eosinophile Leucocytes.	Polymorphs.	Lymphocytes.	Transitionals. Large Monos.	Basophiles.	Eosinophile Myelocytes.	Normoblasts per 100 W.B.Cs.	Megaloblasts per 100 W.B.Cs.
			%		%	%	%	%	%	%		
July 16, 1921 ...	5,400,000	34,000	70	0.65	71.4	14.0	11.3	1.0	1.7	0.7	0.3	0.0
Aug. 8, 1921 ...	5,400,000	35,000	75	0.70	77.3	9.7	7.7	2.3	1.7	1.3	1.0	0.0
Aug. 17, 1921 ...	5,420,000	40,625	75	0.70	80.0	5.0	10.0	2.0	1.6	1.3	1.3	0.0
Oct. 10, 1921 ...	4,800,000	66,250	68	0.00	75.7	2.3	16.3	3.3	1.7	0.7	1.3	0.7
Dec 15, 1921 ...	4,560,000	90,800	84	0.88	72.0	7.0	13.7	3.0	1.3	2.7	0.7	0.3
June 29, 1922 ...	3,576,000	79,680	60	0.85	82.3	4.7	8.7	0.7	2.0	1.3	2.3	0.7
*Sept. 29, 1922 ...	4,087,000	138,250	58	0.71	79.3	8.3	4.7	0.3	1.7	4.7	0.7	0.0

† In the differential counts up to December 15th, 1921, no neutrophile or basophile myelocytes were seen, though examination of the films generally showed their presence. On December 15th, 1921, there were 0.3 per cent. neutrophile myelocytes, and on June 29th, 1922, there were 0.3 per cent. basophile myelocytes.

varied much in size, many being little more than half the diameter of others, while cells very much larger than the ordinary eosinophiles were common. A striking feature in many of the cells was distinct vacuolation of the cytoplasm. The granules themselves varied in size and in their affinity for eosin. In many of the cells the granules were distinctly scanty, clear areas being left in the cytoplasm, which sometimes showed a diffuse basic tint. A few basophilic granules of varying size could sometimes be observed scattered irregularly among the eosinophilic granules. The polymorphs were often observed to be staining faintly, the appearance suggesting either immaturity or degeneration. The granules varied in size to some extent, but there never was the slightest difficulty in distinguishing them from the eosinophilic cells.

TABLE II.—*Showing Proportion of Nuclear Varieties in Cells containing Eosinophile Granulations, based on a count of 300 Cells on seven separate occasions.*

Date.	Myelocyte.	Simple.	Two Lobes.	Three Lobes.	Four Lobes.	Five Lobes.
July 16, 1921 ..	6.0	9.7	63.3	17.7	3.0	0.3
Aug 8, 1921 ...	2.7	9.0	70.3	15.0	2.7	0.3
Aug. 17, 1921 ...	3.0	9.7	65.0	17.3	4.0	1.0
Oct. 10, 1921 ...	2.8	9.3	66.0	18.3	3.3	0.3
Dec. 15, 1921 ...	3.3	14.7	58.7	17.7	5.0	0.6
June 29, 1922 ...	7.2	13.7	57.5	17.5	3.2	0.9
*Sept 29, 1922 ...	8.7	20.3	51.0	14.0	3.0	0.0

Note.—Under myelocytes are included only those cells with round or oval nuclei; under the term "simple," nuclei which are indented but not distinctly lobed.

Many of the granules were poorly coloured, and some showed a faint basic tint. A few isolated white cells were observed whose nature could not be determined with certainty. The nuclei varied from a horseshoe shape to a more convoluted type. In the cytoplasm were both distinct eosinophilic and basophilic granules. Some of these may have been merely degeneration forms, others may have been phagocytic mononuclear cells.

In the last two blood examinations a few distinct neutrophile and basophile myelocytes were seen; they never exceeded 0.3 per cent. The oxydase reaction with alpha-naphthol and paraphenylene-diamine was done on two occasions. The eosinophiles were definitely positive, but the polymorph leucocytes stained poorly, and some of these gave a negative reaction.

Prolonged examination of numerous films failed to show any bacterial or protozoal parasite. A blood culture on June 29th, 1922, also gave a negative result, and the Wassermann test was negative.

Spleen.

This organ was markedly enlarged; it was placed at once in Kaiserling and no cultures were made. After fixation it weighed 1,276 grams and measured 18.5 by 14.5 by 8 cm. There was distinct alteration in shape, being more rounded than normally. There were no adhesions, but the capsule was thickened and showed numerous small round localized patches of fibrous thickening. On removal the organ was fairly firm and elastic. There were no infarcts. On section the pulp was fairly uniform in appearance, being greyish pink in colour. The Malpighian bodies could be seen but were not prominent. They seemed to be reduced in number and varied in size. In or near some of them were dark red and yellow points, apparently indicating haemorrhages of varying age. Towards the hilus were two small glands about the size of peas. On microscopical examination they appeared to be haemolymph glands; they may, however, be lymph glands.

MORBID HISTOLOGY.

Pieces of the spleen and the lymph glands were fixed in formol and stained with haematein-eosin, Van Gieson, methylene blue-eosin, Leishman, Gram's stain, carbol thionin, Levaditi for spirochaetes and also for haemosiderin.

Spleen.

The capsule shows no obvious thickening, and no infiltration with cells. The trabeculae appear to be slightly thickened by rather hyaline fibrous tissue and are infiltrated with eosinophiles in variable numbers. In some trabeculae there is a considerable quantity of haemosiderin both free and within connective tissue cells and especially in the adventitial walls of the vessels. Comparatively few of the Malpighian bodies are of lymphoid structure. Such of these as are present are small with irregular outline and composed of lymphoid cells and no germinal centres. The arteriole shows hyaline thickening. Scattered eosinophiles are present in these nodules, more especially at the periphery; no haemosiderin is found. The majority, however, show definite fibrosis of variable degree and disappearance of the lymphoid tissue. In the more advanced stages the bodies are converted into a small, round, dense nodule of hyaline fibrous tissue. Practically no lymphoid cells are present; connective tissue cells are scanty; but a small number of eosinophiles are present in the interstices of the fibrous tissue. Where the process is less advanced the individual bundles of fibrous tissue, concentric in arrangement are seen, and connective tissue cells are more numerous. In the interstices are numerous eosinophiles and frequently deposits of intra- and extracellular haemosiderin. Lymphoid cells are more numerous and may be rather abundant in one of the sectors at the periphery of the nodule, forming a definite nest of cells. Some of these are situated a little distance from the fibrous nodules, with which they appear to have no connexion, suggesting that they may be foci of compensatory lymphoid regeneration. Others appear to be definitely a residual portion of lymphoid tissue of the main body. In a few of the cellular Malpighian bodies a large area of the lymphoid tissue appears to be replaced by eosinophiles, both leucocytes and myelocytes, while in the surviving portion numerous eosinophiles are scattered. In relation to some of the trabeculae veins of considerable size are seen crowded with leucocytes, mostly eosinophiles.

The pulp is highly and uniformly cellular and filled with nucleated cells. There is no evident thickening of the reticulum. The sinusoids are well seen and are filled with nucleated cells; there is no obvious thickening of the walls, and while the endothelial cells are seen they are not unduly prominent. In several places there appear to be fairly recent haemorrhages into the pulp, and some of these are in the vicinity of a trabecula or fibrosed Malpighian body. The red cells appear very pale. The whole pulp is filled with cells, of which by far the greater number are eosinophile cells. The sinuses, too, contain a great number of these elements, and in many cases to the exclusion of practically all other cells. Eosinophiles are not confined to these places, but also infiltrate the trabeculae, where not infrequently they become elongated or flattened out in the interstices of the connective tissue fibres. They are also seen in similar fashion in the fibrosed Malpighian bodies. In the cellular Malpighian bodies they are found scattered between the lymphoid cells, especially at the periphery. As previously mentioned in one or two instances, they occur in large numbers at the periphery and seem to be replacing the lymphoid cells; nevertheless they are frequently absent from the central area of the Malpighian body.

Beneath the capsule are continuous lines of quite recent haemorrhage in which the red cells are of good colour. These haemorrhages are probably the result of the operation. In both the pulp and sinuses the predominant cells are eosinophilic leucocytes and myelocytes, of which the former are more numerous. The eosinophilic myelocytes vary greatly in size; many are large cells with a large round vesicular nucleus; others are smaller and have a dark round nucleus. The eosinophilic leucocytes are similar to those observed in the blood; the majority have either

a two-lobed or three-lobed nucleus, while cells with four and five lobes in the nucleus occur in smaller numbers. Simpler forms in which the nucleus is merely indented are also seen. Eosinophilic cells were often seen in the process of passing through the wall of the sinuses, but the direction of their progress could not be absolutely determined. After prolonged search a very few examples of what appeared to be a mitotic figure in the nucleus of an eosinophilic myelocyte in the pulp were found, but these were the only indications of proliferation of eosinophilic cells observed in the organ. There was, however, evidence of disintegration and destruction of the eosinophile cells as shown by nuclear karyolysis and disappearance of the granules, and examples of phagocytosis of these cells by mononuclear cells of the pulp and by endothelial cells lining the sinuses were observed. Various stages in the process of phagocytosis could be traced from the inclusion of a comparatively normal cell to the presence of nuclear débris and residual oxyphile granules. The changes concerned both the myelocytes and leucocytes, and were more conspicuous in the pulp than in the sinuses.

In addition, however, to the evidence of destructive change there was also observed to be a definite phagocytic activity on the part of the eosinophilic myelocytes and especially the eosinophilic leucocytes. In and around the splenic trabeculae, where haemosiderin was abundant, there were found oxyphile cells containing several granules of this pigment within their substance, but these cells were not as active in this respect as the mononuclear cells of the pulp and endothelial cells of the sinuses. Where haemorrhages were present, and to a lesser degree in other parts, it was found that some of the eosinophilic leucocytes had ingested red blood cells and there were appearances which indicated that the included red cell underwent digestion. Apart from the great accumulation of eosinophilic cells in the substance of the organ there is little to record concerning the other cellular elements. Red blood cells were distinctly scanty except in the areas of haemorrhage; they were deficient in colour and tended to be conglutinated, and though an occasional nucleated form was observed there was nothing to suggest an erythroblastic reaction. Polymorph leucocytes occurred in small numbers, but no neutrophile myelocytes were seen. Mononuclear cells were scattered in the sinuses and pulp and were actively phagocytic towards red cells, haemosiderin, and oxyphile cells. An occasional giant cell with multilobulated nucleus was observed in the pulp and resembled the myeloplaques of the bone marrow. In sections stained by Gram and carbol thionin no organisms were detected, and Levaditi's method gave a negative result for spirochaetes.

Haemolymph Glands.

Both of these showed a similar structure. The lymphoid tissue was well developed. The follicles, which showed no germinal centres, were thick and cellular, and there was no evidence of atrophy or fibrosis. Eosinophilic cells—both leucocytes and myelocytes—were scattered irregularly in the interstices of the follicles, and more especially in the lymph cords, where they were abundant in the vicinity of the sinuses. They were very scanty in the centres of the dense follicles at the periphery of the glands. In a few places there were appearances analogous to those seen in the spleen—namely, large areas where the lymphoid tissue had been replaced by a dense accumulation of eosinophilic cells, the majority of which were leucocytes. The sinuses contained red blood cells, phagocytic mononuclears, and numerous eosinophiles. The latter presented the appearances already described in the spleen. Frequently oxyphile cells were seen passing through the wall of the sinuses, but here too it was impossible to determine the direction of progress. Eosinophile myelocytes—especially the larger forms—were more numerous in the interstices of the lymphoid tissue than in the sinuses, but no histological evidence was obtained that these cells arose in the former situation. The only mitotic figure seen occurred in an eosinophilic myelocyte lying free in a sinus. Similar changes were noted as regards destruction of eosinophiles as were found in the spleen; in the lymphoid tissue, and especially in the sinuses; phagocytosis of these cells by mononuclear cells was observed.

Eosinophiles were present in both the sinuses and lymph cords, which were phagocytic to red blood cells, and some of them contained granules of haemosiderin. The only other feature of special note was the presence of considerable quantities of haemosiderin which occurred as intra- and extra-cellular masses throughout the follicles and cords in particular, and to a lesser extent within free phagocytes and lining endothelial cells of the sinuses. Further evidence of blood destruction was seen in the presence of numerous mononuclears in the sinuses which had ingested red cells.

Phagocytic Activity of the Eosinophiles.

The richness of this patient's blood in eosinophiles afforded a good opportunity of attempting to estimate their phagocytic power, and observations were made on two separate occasions.

For this purpose we used a culture of *Staphylococcus aureus* from a fatal case of acute infective osteitis; the same organism (twenty-four hours' culture) was used on both occasions. One volume of a standardized emulsion of this coccus with two volumes of the patient's blood was incubated at 37° C. and examined after twenty minutes. The observations were controlled by comparison with the blood of one of us. It was obvious that the eosinophiles were distinctly phagocytic towards the cocci. On each occasion the cocci were counted in 300 eosinophiles. Though a prolonged search was necessary, the number of cocci in 300 of the patient's polymorphs was also noted. In the case of the control blood the eosinophiles were so scanty that only corresponding observations on 300 polymorphs were attempted. The attached table shows the results. (Table III.)

TABLE III.—*Eosinophilia.*

Illustrating the phagocytic power of patient's eosinophiles as compared with his own polymorphs.

Date.	Phagocytic Index of Polymorphs.	Phagocytic Index of Eosinophiles.	Ratio of Phagocytic Power of Eosinophiles to Polymorphs.
December 16th, 1921 ...	6.95	1.78	1 : 3.9
June 29th, 1922	6.86	0.72	1 : 9.5

Illustrating the phagocytic power of patient's eosinophiles as compared with control's polymorphs.

December 16th, 1921 ...	5.18	1.73	1 : 3.0
June 29th, 1922	5.45	0.72	1 : 7.57

These observations leave no doubt as to the very considerable phagocytic power of the patient's eosinophiles, and considering the great increase of these cells in his blood it is obvious that the total phagocytic activity of the oxyphile leucocytes is pronounced. It is also apparent that on the date of the last examination there was a very considerable depreciation of the phagocytic power of the eosinophiles. We have only made a few observations on the relative phagocytic power of the different types of eosinophile leucocytes. The result of these preliminary observations was that while we found some phagocytic power on the part of the eosinophile myelocytes, those with the simple indented nucleus were about twice as active, while the cells with two-, three-, and four-lobed nuclei were evidently the main phagocytes.

Observations on Charcot-Leyden Crystals.

Although the nature and significance of Charcot-Leyden crystals are still undetermined, yet there appears to be strong evidence in support of the view that they are in some way a product of eosinophile leucocytes. The marked eosinophilia present in this patient has afforded an opportunity of inquiry along these lines.

Two volumes of blood were withdrawn, under aseptic conditions, into two tubes on two consecutive days, kept at 37° C., and examined periodically both in the fresh state and in films stained by Leishman. A volume of normal blood was used for control observation. In the first forty-eight hours no crystals were found and the oxyphile leucocytes were well preserved. On the third day an occasional eosinophile leucocyte was observed containing a typical Charcot-Leyden crystal. All the crystals found were intracellular; some were considerably smaller than the diameter of the cell, while others were longer and showed one end projecting outside the cell boundary. The eosinophiles were still well preserved, and there was little evidence of disintegration. On the fourth day large numbers of crystals which varied greatly in length were present. Many of the small forms were intracellular, while the large ones—several times the diameter of a leucocyte—were lying free. Frequently two or more small crystals were observed within the same cell. In the stained films both extra- and intracellular crystals were coloured a faint blue by the Leishman, while a few eosinophiles were seen to contain clear colourless spaces in their cytoplasm which from their shape and size evidently represented the positions of crystals which had been dislodged from the cell. There was now more evidence of broken down leucocytes than previously, although eosinophiles of normal appearance were abundant.

Examinations made on the fifth, sixth, tenth, and fourteenth days confirmed the appearances already noted, save that on the last occasion the blood had become contaminated by bacteria. It is of interest to note that eosinophiles of practically normal appearance persisted throughout in large numbers. No crystals were found in the normal blood at any time during the observations. Throughout the series of examinations the appearances strongly suggested that the small crystals were contained within the oxyphile leucocytes, and not merely adherent to the surface of the cells. In fresh preparations agitation and pressure failed to release the crystals until the cell had been ruptured, while the appearances already described in the stained films confirm this view. The presence of intracellular crystals did not appear to be associated with any specific alteration in the structure of the cell, the crystals being found within both well-preserved cells and ones which were obviously degenerated. As far as could be seen there was no appreciable difference in the number of crystals found on the fourth day and the fourteenth day. No evidence of crystal formation was found in the polymorph leucocytes or other cells of the blood. The crystals were a faint green tint, refractile, and had an octahedral shape. They were soluble in hot water, 2 per cent. acetic acid, and NaOH; insoluble in absolute alcohol, ether, xylol. They did not stain with 5 per cent. alcoholic eosin or Sudan III.

The appearances found lead us to suggest: (1) that the crystals are first formed within the substance of the eosinophile leucocytes; (2) that the cells eventually break down and liberate the crystals, which then grow into larger formations;

(3) that there is no definite evidence that the crystals primarily arise from the oxyphile granules of disintegrated eosinophile cells; and (4) that the conditions which lead to the formation of crystals appear suddenly about the third to fourth days. This case would appear to afford a good opportunity for further work on the lines of Liebreich's[1] investigations on the relationship of eosinophilic granulations to the coagulation of blood.

In view of the suggestion which has been made by some writers that the yellowish tint of the lymph glands in lymphadenoma is due to the presence of eosinophilic cells, it seemed to us that the present case provided a suitable opportunity for determining the colour produced by eosinophilic leucocytes *en masse*. About 5 c.cm. of blood were obtained from a vein and allowed to coagulate. The "buffy coat" which formed showed no yellowish tint, and appeared identical in colour with a normal control coagulum, nor did any such tint develop after more than a week.

CONCLUSIONS.

It is only possible to speculate as to the real nature of this condition. Judging from the literature we have access to, it seems to be extremely rare. The only similar case which has been recorded in any detail was described by Giffen.[2] The case was observed in the Mayo Clinic and was described as "persistent eosinophilia with hyperleucocytosis and splenomegaly." The case presents in all its essential features such a close similarity to our own that it is impossible to come to any other conclusion than that we are dealing with a definite clinical and pathological entity. Giffen summarizes the case as follows:

"F. H., male, aged 31 years. Marked splenomegaly. Slight enlargement of superficial lymph glands. Leucocytosis 21,800 before splenectomy, with an eosinophilia of 73.6 per cent. Splenectomy July 15th, 1914. Weight of spleen 2,110 grams. Macroscopic appearances of spleen similar to that of myelogenous leukaemia. Rapid increase of leucocyte count to 97,200, and later to 211,000; eosinophilia from 79 to 90.7 per cent. Good general condition for period of four years following splenectomy. Death January 19th, 1919, of empyema following pneumonia. Necropsy: Enormous numbers of eosinophilic polymorphonuclears in all haemopoietic organs. Eosinophilic myelocytes numerous in lymph glands, spleen, and bone marrow. Obliterative pericarditis and fibrous perihepatitis."

[*Note.*—There is probably a clerical error in the above account. The description of the spleen, which had been removed four and a half years previously, is included in the *post-mortem* record.]

One gathers from the account of the case that the patient was first seen in March, 1913, and at that time the total white cell count was 15,400, with 66.3 per cent. of eosinophiles; the liver and spleen were enlarged. The known duration of the disease was six years, while the clinical history suggested one and a half years prior to this. Splenectomy was performed in 1914. It is stated that the eosinophiles in the spleen at this time were much less numerous than in the lymph glands examined at the *sectio* four and a half years later.

In reviewing the literature Giffen states that he has only found one similar case, that of Stillman.[3] Stillman describes his case only very briefly under the title of "Myeloid leukaemia with predominance of eosinophile cells."

The patient, a native of Spain, was observed in the New York Hospital in 1911. He was a man 27 years of age, and was apparently syphilitic. He was anaemic, and showed some general enlargement of lymph glands. There was enlargement of liver and spleen. The urine constantly showed a trace of albumin and a few casts. There was no evidence of a parasitic invasion of the alimentary canal.

The leucocyte count varied from 118,000 to 165,000 per c.mm., and eosinophiles from 85.8 to 91 per cent. A differential count at a time when the number of leucocytes was 165,000 gave the following results:

Polymorphs	3.8	per cent.
Eosinophile polymorphs	69.8	,,
Eosinophile metamyelocytes	19.4	,,
Eosinophile myelocytes	1.8	,,
Mesoblasts	0.2	,,
Transitionals	0.8	,,
Lymphocytes	4.2	,,

The eosinophiles were rather larger than those usually seen in the blood and the granules were rather smaller. Normoblasts were present in a ratio of 2 per 100 leucocytes.

The patient was lost sight of and the subsequent history is unknown.

Assuming that the "metamyelocytes" in this account were only varieties of the eosinophiles, and that the true myelocytes were only 1.8 per cent. as stated, the case can hardly be described as an ordinary leukaemia, and would apparently find a place in the special group we are now considering.

It is indeed remarkable that, considering the very definite blood changes in this condition, we have found such a small number of recorded cases. The condition could hardly be missed in an ordinary full examination of the blood, and even assuming that other cases have been recorded since 1919 the condition must be regarded as very rare indeed.

We have heard of another case, under the care of Dr. Edwin Matthew, Edinburgh, in 1909, which has some points of resemblance to ours. The patient, a girl of 12, was under observation in Leith Hospital for about six weeks. She was admitted for digestive trouble, but a marked eosinophilia was found, the leucocyte count from 12,000 to 15,000, and repeated differential counts showed an eosinophilia percentage of 85. Parasitic infection was excluded. There was no splenomegaly. This may well have been an early stage of the condition we are describing, and the subsequent history would have been most interesting. Unfortunately the family left the district soon after the patient's discharge from hospital, and nothing further has been heard of the case. Aubertin and Giroux[4] report a case which resembles those described by Giffen and Stillman.

The patient was under observation for four years suffering from dyspnoea and cyanosis. A diagnosis of primary sclerosis of the pulmonary artery with consecutive cardiac insufficiency was made. The spleen was slightly enlarged. There was a marked permanent eosinophilia; the total white cell count averaged about 10,000 per cubic millimetre, varying between 6,900 and 26,000. The percentage of eosinophiles remained constantly between 65 and 70.

A parasitic origin of the eosinophilia was excluded; the Wassermann reaction was negative. The patient died of cardiac failure. The autopsy confirmed the clinical diagnosis of sclerosis of the pulmonary artery but, unfortunately, no study of the blood-forming organs was made.

The authors consider that the cause of the eosinophilia in this case was anoxaemia, and point out that Giffen's case also was associated with serious cardiac disease. So far as the clinical observations on Stillman's case go, it may be pointed out that there was no evidence of cardiac disease. They discuss the arguments for and against the condition being a leukaemia, but appear to negative the idea. It is doubtful if this case can be considered as belonging to the group we are now describing—the total leucocyte count never exceeded 26,000 and the blood condition did certainly not progress as in Giffen's case and our own. The subsequent history of cases resembling that of Aubertin and Giroux may be very interesting, for we have no real evidence in our own case nor in those of Giffen and Stillman of how long the disease had been in existence when the patient first came under observation. Apart from splenic enlargement or from some complication, it is difficult to imagine how attention would be directed to the blood, and without a blood examination the condition could not be recognized.

Of more importance, however, in our present discussion is a case of "splenomegaly with polymorphonuclear neutrophil hyperleucocytosis" described by Tuohy.[5]

The case was that of a female, aged 58. She had acute arthritis at 16, but there was nothing else of moment in her family or past history till she developed uterine prolapse at the age of 40. Her present illness started with pain in her side, and on examination she was found to have an enlarged spleen. On physical examination nothing was discovered beyond a pessary, which she had worn for fourteen years. There was local irritation as a result. This soon subsided. A blood examination showed a leucocytosis of 65,000. A differential count showed 99 per cent. polymorphs. The discomfort and abdominal distress suggested the advisability of splenectomy. This was carried out successfully, with an uninterrupted recovery. The leucocyte count rose, however, in three days to 240,000, but the leucocytosis subsided in about a month to 45,000. For over a year she was able to carry on her household duties, but some seventeen months after the splenectomy she succumbed to an acute pneumonia after a week's illness. Unfortunately no details of the blood condition after she left hospital in 1917 are available, and an autopsy was not permitted.

In discussing the case, Tuohy draws a parallel between his case and that of Giffen, and regards them both as examples of a condition where there must be a hyperplasia of individual elements in the bone marrow—namely, the neutrophile myelocytes and eosinophilic myelocytes respectively. He regards the condition as a hyperleucocytosis rather than a leukaemia. He draws a distinction depending on whether the myeloblastic reaction is lawful and benign, or, as he puts it, Bolshevistic and malignant. We have heard of another case of hyperleucocytosis, where basophile leucocytes were the predominant cells. We have no details, however, and cannot vouch for the observation. Gluzinski and Reichenstein[6]

report a case of myeloma in which a large proportion of 39,640 leucocytes per cubic millimetre were of the plasma cell type, and speak of a plasma cell leukaemia.

As will be stated presently, we are rather inclined to regard our case as one of leukaemia of a special type, and in view of the above observations it may be necessary to widen our conception of leukaemia and be prepared to find isolated examples of benign leukaemias affecting neutrophile, eosinophile, and basophile elements.

As we have said, one can only speculate as to the cause and nature of this condition. It seems possible, however, to arrive at some general conclusions. Giffen[2] was inclined to regard the condition as an instance of an "eosinophilic leucocytosis, the blood picture of which was remarkably altered by splenectomy," rather than a true leukaemic condition, though he is not prepared to exclude altogether the latter suggestion. He further states that the condition "may be indicative of some special function of the spleen with respect to eosinophilic cells or with respect to the toxins which eosinophilic cells are capable of absorbing."

In the first place, we cannot see that the splenectomy has seriously influenced the condition or modified the blood picture to any extent in either his case or our own. The splenectomy has only been followed by a more marked blood condition, the essential qualities of which have been otherwise unchanged. It may be pointed out also that Stillman's case, which appears to be of the same nature, ran a similar course in the absence of splenectomy.

An attempt to draw a distinction between an eosinophilic leucocytosis in response to some definite toxic influence, and a true leukaemic condition would appear to us to be extremely difficult in the present state of our knowledge, but it is very difficult to bring this small group of cases into line with cases of eosinophilia due to known toxic influence. The degree of eosinophilia here, both relative and absolute, its persistence, and its increasing intensity do not seem to us to fit in with what we know of eosinophilia due to a definite toxin, say of some animal parasite. We have excluded so far as we can in our case the ordinary established causes of eosinophilia, with the exception of trichinosis. Giffen, in his case, did this during life by removal of a portion of muscle, and the *post-mortem* examination also proved negative in this respect.

We are rather inclined to the view that we have here a condition of the bone marrow primarily affecting the eosinophilic elements; a condition therefore more allied to a true leukaemia but of a most unusual type. The essential source of the eosinophiles we regard as the bone marrow. We do not find any active formation of eosinophiles in either the spleen or the haemolymph glands examined. The intense infiltration of these organs with eosinophile cells we regard as merely the result of filtration of these cells from the blood. Evidence of actual mitotic division of eosinophilic myelocytes, though present, is extremely slight. It appears to us much more probable that the few dividing eosinophiles observed came from the blood and were not formed locally. On the other hand, evidence of destruction of the eosinophiles by a phagocytic action on the part of the other cells in the spleen and lymph glands seems perfectly clear in our case. The gradual rise in the number of the eosinophiles may be due to the persistence of the original cause whatever it may be, but this may be accentuated by the loss of so much phagocytic tissue following removal of the spleen, or by the gradual loss of the phagocytic action of the endothelial or other cells through the slower retrogressive change in the spleen where not excised—for example, in Stillman's case—and in the lymph glands. As we have said, we have entirely failed to demonstrate any infective agent in this case, and, though this does not enable us to deny its existence, it seems fully more reasonable to explain the condition by some altered habit of the cell such as occurs in true neoplasia and not necessarily dependent on some external agent or influence.

It is to be feared that there is less doubt as to the course and termination of the disease. So far there is no evidence that this patient's blood is inferior to that of a healthy person in phagocytic and protective power. We have inquired particularly in this direction and, so far as we can ascertain, this patient, who by the nature of his work often suffers from cuts and abrasions on his hands, differs in no way from a normal person in the direction of a greater liability to local infections or in the healing power of his tissues. Not only, however, must there be a great and increasing strain on the bone marrow from this eosinophilic hyperplasia, but the other bone-marrow elements must be suffering from the excessive infiltration with eosinophiles, and we must expect a steady deterioration of the marrow as a whole with a consequent increasing risk of secondary infection. A terminal infection will still further complicate the problem, and in the event of a fatal issue we can hardly expect much light on the original and essential cause of the disease.

The result of splenectomy in this case seems worthy of some consideration. As in Giffen's case, removal of the spleen has resulted for the time being at least in great improvement in the patient's physical condition, all the more remarkable when one notes that during this time the eosinophilia was becoming more marked. Splenectomy is the fashionable operation of the day. In many conditions no doubt—for example, certain types of splenic anaemia and acholuric jaundice—splenectomy may result in an apparent cure. We have seen examples of this, and apparently in some localized infections of the spleen—for example, syphilitic and tuberculous—a favourable result may also be obtained by splenectomy. The operation has, however, been frequently performed in recent years in conditions where at best only a temporary improvement can be anticipated, though a study of the after-results in these cases may add to our knowledge of the obscure problem of the functions of the spleen. Time does not permit us to even refer to the many theories, or rather vague hypotheses, which have been advanced. A glance at the cursory way in which the subject is dealt with in even our standard works on physiology will convince us of our ignorance in this direction. Though the operation has often been performed in diseases in which cure cannot be looked for by this treatment, there seems no doubt that an apparent temporary improvement often occurs, and there is increasing evidence to show that the spleen may have an important though indirect influence on blood formation in addition to the well-established destructive action on effete cells. Recent experimental work by Eddy[7] points in this direction. It may well be that the explanation of some obscure blood conditions will be found in a perversion of this function.

In our present case the improvement in the physical condition following splenectomy, associated as it was with an increase in the eosinophilia, appears to us to be evidence in favour of the view that no active formation of eosinophiles was occurring in the spleen. The rise in the eosinophile count is more easily explained by the loss in amount of the phagocytic tissue of the spleen. It must be admitted that if this were so one would have expected that for a time at least after the removal of the spleen the blood counts would have shown a higher proportion of older eosinophile cells if, as seems reasonable, an increasing lobulation of the nucleus points to an older type of cell. As has been pointed out, however, the proportions of the different types of eosinophiles has remained remarkably constant. It must be remembered, of course, that in this case the spleen was removed after it had undergone a considerable amount of structural change, and judging from the alteration in the haemolymph glands and from the evidence of their increased phagocytic action, some of the functions of the spleen had evidently been already taken on by the glands for some considerable time. The alteration produced by the splenectomy was therefore not so sudden as may appear at first glance and the preservation of the different proportions of the eosinophiles may be only further evidence of the delicately regulated mechanism for dealing with effete blood cells, both red and white.

It is, of course, clear that patients may survive a splenectomy without apparent harm being done to the general health. Splenectomies necessitated by traumatic rupture prove this. At the same time one is left with a certain uneasy feeling that we have no clear conception of what actually occurs when the spleen is removed. The size of the spleen, its anatomical relationship (especially its relation to the portal circulation), its possible relation to gastric function, all seem to make it very improbable that all of its function can be completely compensated for by a hyperplasia of lymphoid tissue elsewhere in the body. Further information would seem to be urgently required as to the later histories of cases of splenectomy. The *post-mortem* examination of cases which survive the operation for some years might yield some information of importance, and the clinical histories of such cases should be even more carefully studied than has been the case in the past, with special reference to the question of increased liability to infection or diminished capacity to deal with it when it does occur. In such a condition as the case now recorded, of course, a liability to secondary infection might almost be looked for as a direct result of the disease and the consequent strain on the bone marrow.

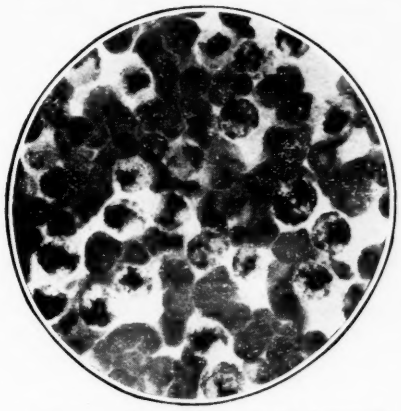


FIG. 1.—Blood film showing the degree of leucocytosis; practically all the cells present are eosinophiles. The variation in the size of the white cells and in the number of the granules is well seen.

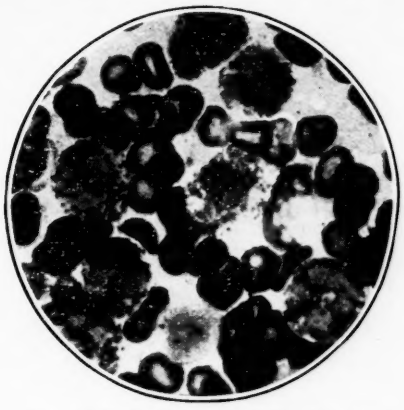


FIG. 2.—Blood film showing the characteristic eosinophilic granulations. In the cell towards the top of field the clear vacuoles described in the text are well seen.

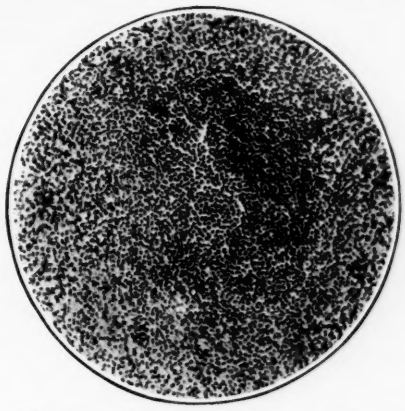


FIG. 3.—Section of spleen showing replacement of a large area of a Malpighian body by eosinophiles. (The larger cells towards one side of the body.)

FIG. 4.—Section of spleen, showing in the centre of the field an atrophied Malpighian body with replacement fibrosis. The lymphoid nodule in the vicinity may represent the remains of the Malpighian body or an attempt at compensatory lymphoid hyperplasia.

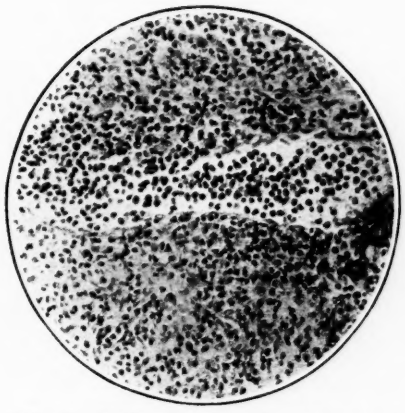
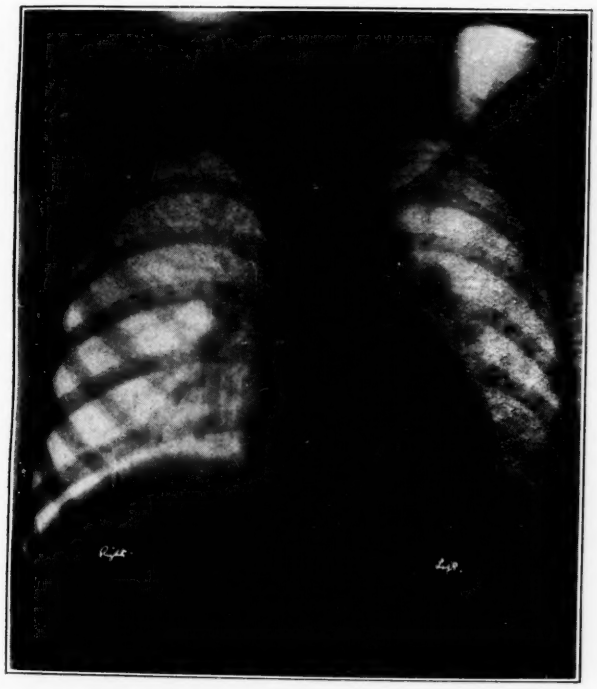


FIG. 5.—Section of spleen, showing a sinus crowded with eosinophiles, which are also infiltrating the surrounding pulp.

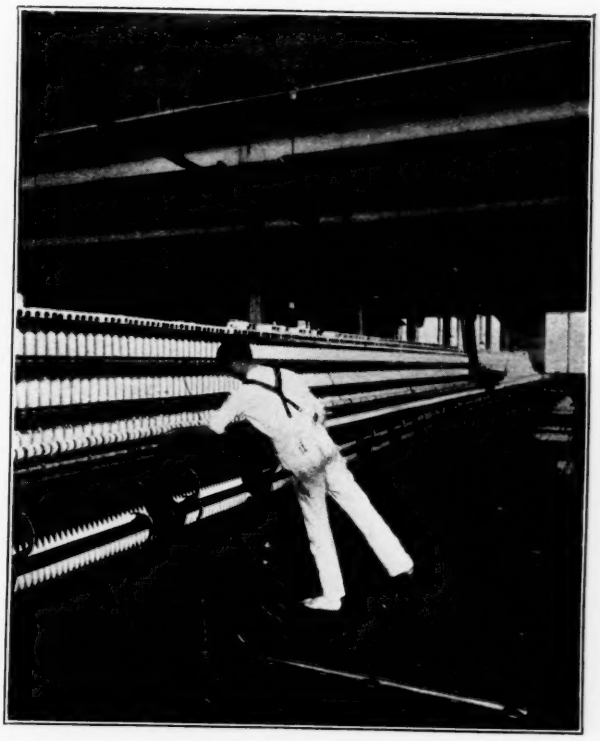
FIG. 6.—Section of haemolymph gland, showing a sinus containing red cells, numerous eosinophiles, and phagocytic cells enclosing haemosiderin. Free red cells and eosinophiles are present in the surrcundin lymphoid tissue.

TILLEY: PAPER FASTENER REMOVED BY DIRECT PERORAL BRONCHOSCOPY.



Dr. Salmond's skiagram of patient's chest, showing the paper fastener in the distal portion of the left bronchus.

SOUTHAM AND WILSON: CANCER OF SCROTUM.



Photograph showing the characteristic attitude adopted by the mule-spinner when leaning over the machine to piece the broken threads.

Fig. 1.—Plantar aspect of squamous epithelioma and hyperkeratosis, following arsenical administration.

Fig. 2.—Keratosis plantaris (arsenical).

Fig. 3.—Keratosis palmaris (arsenical).

Fig. 4.—Microphotograph (1/3 Zeiss objective). Squamous-celled epithelioma with cell nests, and neoplastic endolymphatic extension, etc.

Fig. 5.—As Fig. 4 (1/7 Zeiss objective). Note cell nest.

What may actually happen after excision of the spleen is well illustrated by a case published by McAdam Eccles and Freer.[8] In this case splenectomy was performed for traumatic rupture in 1910. In 1920 the patient was again operated on for a ventral hernia, the result of the first operation, and on this occasion what appeared to be a spleen normal in every respect was observed in the course of the operation. The evidence of a new formation of a spleen seems perfectly clear from the facts presented. The authors regard this as having resulted from a hypertrophied spleniculus which may well have escaped notice at the first operation. This remarkable occurrence seems to indicate clearly the advisability of leaving behind any such spleniculus which may be observed in the course of an operation for splenectomy necessitated by trauma.

Further Report.

Since this paper was read we have had another opportunity of seeing the patient and making a further blood examination with the following result. The details of this blood examination appear at the end of Tables I and II, and are marked with an asterisk.

The patient reported, by request, at the Royal Victoria Infirmary on September 28th, 1922. He says that he feels perfectly well, appetite is good, and he has no pains anywhere. Is still constantly at work, which is obviously strenuous. He looks rather fine drawn; his appearance suggests some anaemia. His weight is 9 st. 3 lb., representing an increase of 6 lb. since the end of June. The superficial glands referred to previously are still palpable, but if anything are smaller than previously. There is no enlargement of liver; there is no dullness in splenic region.

Urine.—Reaction, acid; albumin, nil; sugar, nil. Deposit: No casts or cells; abundant deposit of amorphous urates.

Faeces.—No parasites or their ova found.

Blood.—Red blood corpuscles, 4,087,000 per c.mm.; white blood corpuscles, 138,250 per c.mm.; haemoglobin, 58 per cent.; colour index, 0.71. The appearances of the films show no essential difference from that previously seen. In a differential count of 300 leucocytes the eosinophiles account for 79.3 per cent. Coagulation time was 4 minutes, against a normal control time of 5½. There appeared to be again some diminution in the blood platelets.

The result of this last examination gives further proof of the progressive nature of the disease so far as the blood condition is concerned. The patient remains under observation and the progress of the case will be recorded at a later date.

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CANCER OF THE SCROTUM:

The Etiology, Clinical Features, and Treatment of the Disease.

BY

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[*With Special Plate.*]

Epithelioma of the scrotum has hitherto been generally regarded as a disease which occurs chiefly among chimney-sweeps. It is practically the only type of malignant disease met with in the scrotum, and has received the distinctive name of "chimney-sweeps' cancer" for that reason.

The earliest accounts of sweeps' cancer appear to have been written by Mr. Potts and Mr. Henry Earle[1] in 1832. Sir James Paget in his *Surgical Pathology*, published in 1853, states that this disease is fairly common in England in large towns, but in other countries is rarely seen. The most interesting communication on this subject was Sir Henry Butlin's[2] three lectures at the Royal College of Surgeons in 1892 on "Cancer of the scrotum in chimney-sweeps and others." He found the disease was seldom seen except in Great Britain, and that it occurred chiefly among sweeps. In 48 collected cases 34 were chimney-sweeps, the remainder being in other employments, showing an enormous preponderance among the former class. He came to the conclusion that it was due to the irritant action of soot on the parts, and he further pointed out that it did not occur where wood, peat, and charcoal were burnt, nor did coal-miners suffer from this condition.

In the report of the Departmental Committee on Compensation for Industrial Diseases (1907) it is stated that the mortality for cancer among chimney-sweeps is twice that among occupied males generally. For the three years 1900–2 the comparative mortality figure for cancer among sweeps between the ages of 26 and 65 was 133, as compared with 63 among other occupied males of the same age.

In 1916, in *Diseases of Occupation*, Sir Thomas Oliver states that scrotal cancer is prevalent in chimney-sweeps and he attributes this to some peculiar chemical change when coal is burnt, whereby the soot formed has specially irritating characters on the skin. Reference to any of the leading surgical textbooks gives a general impression that epithelioma scroti is relatively common in chimney-sweeps, whilst Thomson Walker[3] writes: "Epithelioma of the scrotum is more frequent in chimney-sweeps than in other males, and has thus received the name 'chimney-sweeps' cancer.'" It has more recently been established that prolonged exposure to tar and its products tends to produce epitheliomatous ulceration of the skin. In January, 1920, the Home Secretary made epitheliomatous ulceration due to tar, paraffin, and mineral oil a notifiable industrial disease. This form of ulceration is liable to occur on the scrotum. In view of these statements we were led to make further inquiry into the incidence of this disease, and proceeded to collect and investigate all the cases of cancer of the scrotum admitted to the Manchester Royal Infirmary from the years 1902 to 1922. During this period 141 cases of this nature attended the hospital, and out of this total there was only one single case whose occupation was that of chimney-sweep.

Further inquiry has enabled us to throw additional light on the etiology of this condition—a matter of considerable importance, both as regards the causation of cancer of the scrotum and the preventive methods that may be adopted to reduce the occurrence of the disease.

Etiology.

During the period under review 141 cases of cancer of the scrotum atttended the Royal Infirmary—an average of seven cases each year. The average age of these patients was 51 years when seen at the hospital. The following is an analysis of their occupations, and is of considerable interest:

Mule spinners	69
Tar and paraffin workers	22
Sweeps	1
Various occupations*	38
Occupations not stated	11
	141

These figures show that epithelioma of the scrotum was largely associated with two occupations in South Lancashire—cotton-spinning and workers in tar and paraffin. Spinning being one of the chief industries in the district we were led to continue our investigations and endeavour to ascertain what connexion, if any, existed between this occupation and the disease under consideration. It would appear that there is some factor in the trades of sweeps, tar workers, and cotton-spinners whereby the skin of the scrotum is liable to the occurrence of cancer.

1. *Chimney-sweeps.*

Sufficient has already been written under this heading to show that in the past soot was considered an important factor in the production of cancer. In our series of 141 cases, however, there was only a single chimney-sweep. It may be assumed that with improved methods of chimney-sweeping, and greater attention to cleanliness on the part of the workers, chimney-sweeps' cancer is on the decline, in Lancashire at any rate.

2. *Tar and Paraffin Workers.*

The relation of tar and cancer was first recognized by Professor Volkmann[4] in 1875. He published a paper on "Tar,

* No definite etiological factor was discoverable in this group, many being classified as labourers, and no details of their employment given. In two cases a truss had been worn on the side of the growth for a number of years.

paraffin, and soot cancer," and described three cases where epithelioma of the scrotum occurred in workers in these substances. In 1876 Dr. Joseph Bell[5] independently described two cases of carcinoma of the scrotum under the title "Paraffin epithelioma of the scrotum." Tar and paraffin are now regarded as active agents in the causation of cancer, due to their irritant action on the tissues.

Recent research has shown that cancer can be produced in animals. Bloch and Dreifuss[6] produced tumours in mice by painting their backs with coal tar in 160 days, and also found metastatic deposits in their lungs. As already stated the Home Office has made ulceration due to tar and paraffin a notifiable industrial disease. Forty-five cases of this nature were notified in 1920. One may therefore conclude that from experimental and clinical evidence it is possible by the repeated application of these substances to produce cancer of the skin. In man there appears to be a correlation between these substances and cancer of the scrotum, just as smoking has long been considered to predispose to cancer of the mouth.

3. *Cotton-spinners.*

In the present investigation we propose to discuss another occupation which accounted for the largest number of cases in the series. Cotton-spinning has not hitherto been considered an industry of importance in this respect. In the present series 53 per cent. of the cases whose employment was ascertainable were engaged as mule-spinners. To further investigate this matter we have visited a cotton mill in the Pendleton district of Manchester, and examined the men and the conditions under which this class of work is carried out.

Mule-spinning is undertaken entirely by men, women not being employed in this process of the cotton trade. Many of the workers have spent the greater part of their lives in the mill—often upwards of thirty years. The fact that in so large a proportion of the cases the growth has been found to be situated on the anterior aspect of the left side of the scrotum led us to consider if there was any special factor in the occupation of mule-spinning to account for that position.

For the information of those who are not familiar with the mule-spinning process it may be said that the special feature is a type of movable rack, known as the carriage, which carries the receiving spindles for the yarn that is being spun from the cotton. This carriage varies in length, and may be as long as ten to twenty yards, and carry 1,000 or 1,500 spindles. The carriage is worked by machinery, moving continually to and fro, the stretch being usually sixty-four inches. This movement occurs three times in the minute. On the carriage, about three feet from the ground, is a steel bar extending the length of the machine. This bar is found to be moist with the lubricating oil thrown out by the spindles as they revolve; the oil further contaminates the clothes of the spinner, for careful oiling of the spindles is necessary. As the carriage moves to and fro the cotton threads which are being spun into yarn may break from time to time. It is the duty of the mule-spinner, or minder, to follow the mule and attend the spindles and piece the threads when they break. This necessitates him constantly leaning over the carriage, which brings his thighs and scrotum into contact with the oil-covered bar and its accessories. In watching the spinner at work one is struck by the fact that when leaning over to piece the threads he almost invariably stands on the left leg, the right leg being thrown out behind to act as a counterbalance as he bends forwards. He meanwhile pieces the threads with his left hand. This results in the left groin and left side of the scrotum continually coming into contact with the bar of the carriage. The workers state that they are accustomed to adopt this attitude from their earliest days. (See Special Plate.)

The atmosphere in the mill where the work is carried on is extremely warm and humid and the men perspire freely. Under these conditions the mule-spinner wears the minimum amount of clothing. He works in a shirt and a pair of washable linen trousers and has bare feet. These trousers are said to be washed each week, and an inspection at the end of that period shows a well-marked oil zone, six to eight inches in depth, across the body at the level of the upper part of the thighs and lower abdomen. This oil penetrates the trousers and the lower border of the shirt also becomes soaked with it. The skin in this region is therefore constantly exposed to contamination and irritation from the oil, and itching and scratching of the parts is found to be by no means uncommon. The oil in general use is said to be a mineral oil of the paraffin series.

The striking feature which becomes evident is the liability of the scrotum to be affected with cancer in certain occupations. Epithelioma of the scrotum is a disease of adult life and mature adult age, and in the majority of cases it appears to arise as the result of the specific action of some substance on the skin of the scrotum. This substance may be met with in soot, tar, and oil, and probably acts as a local irritant, and so prepares the tissues whereby cancerous growth may take place. In the case of the mule-spinner it would appear that the scrotum is liable to irritation, a point further emphasized by the fact that in most of the cases the ulcer was found in the same situation—namely, the anterior aspect of the left side of the scrotum. The actual cause of the irritation seems to depend on two factors:

1. *Mechanical.*—The result of friction of the parts with the clothing and the repeated traumatism of the body against the machine over which the spinner works. In addition there is the contamination of the clothes with dirt and sweat unless particular attention is paid to cleanliness.

2. *Contact with Oil.*—As regards the oil factor, the continual soiling of the clothes with oil and the knowledge that in other forms of cancer tar and paraffin are recognized as direct etiological agents—a view which has received considerable support from experimental work on animals—suggests that the oil, which has a highly irritant action on the tissues of the skin, may be of considerable importance.

These factors may lead to the production of a wart, the usual form in which the growth is found to originate, and in those above middle age, and in individuals susceptible to its effect, takes on the characteristics of epithelioma. It is our intention to further investigate at the Manchester University the cancer-inducing properties, if any, of the various lubricating oils in common use in cotton mills.

Clinical Features.

From anatomical considerations it might be expected that the scrotum would be peculiarly liable to cancer. Its position, its exposure to continual irritation, its roughness, and the presence of hairs all predispose to the accumulation of dirt and septic matter and lead to irritation of the parts.

Whilst in general features epithelioma of the scrotum closely resembles other forms of surface cancer, particularly epithelioma of the lip, yet it exhibits certain differences from the typical chimney-sweeps' cancer as described by Butlin. Multiple warts are not the rule. The growth, in our experience, is nearly always solitary and most commonly situated low down on the anterior aspect of the scrotum on the left side (84 per cent. of cases). In 10 per cent. it was localized to the right side, and in 6 per cent. it commenced in the mid-line of the scrotum.

The earliest manifestation is almost invariably a wart, yet even this cannot be regarded as of an innocent nature, for local removal of this wart is frequently followed by the appearance of malignant deposits in the groin some twelve to eighteen months later. This no doubt explains the so-called cases of primary epithelioma of the inguinal glands described by Butlin and others. The patient has forgotten all about the wart, and the resulting scar is so small and difficult to recognize in the rugose scrotum, or the growth has been missed owing to imperfect observation. It would appear that there is no definite pre-cancerous stage but that the wart is malignant from the beginning. The warty stage persists for some four to six months, the tumour varying in size from sixpence to half a crown, then ulceration occurs, and the typical epitheliomatous ulcer develops. The rate of growth varies, but on the average from the time of onset to the time the patient came to hospital for treatment was twelve months.

Local spread is not of a very rapid character; in 6 cases of the series the testicle was involved by the growth, whilst in only 3 did it spread on to the penis. On the other hand, secondary involvement of the inguinal glands is extremely common, the early enlargement being due to inflammatory changes. Later they become the seat of definite malignant deposits.

Recurrence of the disease in the groin is very common; this is probably owing to the fact that in many cases a radical operation had not been performed, the glands having simply been locally excised, and only in the more recent cases has the operation performed been of sufficient extent to remove all the infected tissues.

As regards the last stages of the disease the most conspicuous feature is the breaking down of the malignant

glands in the groin, death in some cases being due to haemorrhage from the external iliac or femoral vessels; in other cases death is due to septic absorption and exhaustion. In only one case of the series was the peritoneum involved; in this case, as the bowel also was affected, it was necessary to do a colostomy. There appears to be little tendency to the formation of metastases in distant organs.

TREATMENT.

The operative treatment of cancer of the scrotum usually receives but brief discussion in the surgical textbooks. The technique of the operation is of considerable importance, for when this is radically performed there appears a good prospect of a successful result. Glandular metastasis occurs fairly early, and it is only by a complete dissection that all the infected tissues in the inguinal regions can be satisfactorily removed. The importance of the lymphatics draining from the scrotum was emphasized by Morley[7] in 1911, and an attempt made to place the operation on a sound anatomical basis. The technique here described is largely based on the result of that work.

The radical operation consists in removal of the growth in the scrotum together with a wide margin of healthy tissue around it, and the complete excision of the glands and surrounding fatty tissue in both groins. The operation is in many respects similar in type to the radical amputation for carcinoma of the breast and merits equal attention. The scrotal growth is excised with at least one inch of healthy skin surrounding the base of the tumour; the whole thickness of skin and dartos should be taken away. The lymphatic glands must always be removed from both groins. There is free anastomosis between the superficial lymphatic network of opposite sides, and if the growth approaches the median raphe bilateral infection may be present at an early date.

The operation differs in one respect from the radical amputation of the breast in that the so-called block dissection, where the entire glandular area and the lymphatic trunks between the tumour and the glands are cleared away, does not appear to be necessary. It is found sufficient to remove the scrotal growth and the tissues of the groin through separate incisions. This is comparable to the operation performed for malignant disease of the tongue, where it is not usually considered necessary to remove the tissues between the growth and the glands. The best incision for removal of the glands is one parallel to and below Poupart's ligament, extending from the anterior superior spine to the spine of the pubes; from the centre of this a vertical incision is carried a short distance down the thigh. This incision allows good exposure of the infected tissues and their easy removal. The earliest glands that may be infected, when the growth is on the anterior aspect of the scrotum, lie just internal to the anterior spine, so the dissection must be carried out to this point All the glands and fatty tissue in Scarpa's triangle should be excised and the vessels left stripped clean, whilst the upper part of the saphenous vein may be removed with advantage.

CONCLUSIONS.

1. Epithelioma of the scrotum is rare among chimney-sweeps in South Lancashire.
2. In this district the disease is most frequently met with in mule-spinners ("mule-spinners' disease").
3. The growth is usually situated on the anterior aspect of the left side of the scrotum, a position explained by the occupation of the spinner.
4. The etiology appears to depend on chronic irritation, the result of friction and contact with oil.
5. It is doubtful if the condition is preceded by an innocent stage.
6. The disease is similar in general features to other forms of cutaneous cancer and equally malignant.
7. The only hope of successful treatment lies in early and radical operation.

Through the courtesy of the members of the honorary staff of the Manchester Royal Infirmary we are enabled to record the cases in this series.

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THE REMOVAL OF A PAPER FASTENER BY DIRECT PERORAL BRONCHOSCOPY

AFTER ITS IMPACTION FOR TWENTY-ONE MONTHS IN THE LEFT BRONCHUS.

BY

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[*With Special Plate.*]

THE case here recorded has so many features which should be of practical interest to every class of practitioner that I have thought it worthy of record.

On Saturday, October 2nd, 1920, J. H., aged 5, swallowed a paper fastener. A violent fit of coughing immediately occurred and lasted about five minutes; this was accompanied by "pain in front of the left chest, which passed off in some three hours." Four days later, while at a children's party, such an alarming fit of coughing came on that the child's father and doctor were sent for and the patient was taken home in a motor car. He remained in bed for a month with symptoms of "acute bronchitis of the left lung." As the symptoms did not clear up a skiagram of the chest was taken on November 29th, but the result was so imperfect that it afforded no clue to the cause of the trouble. From that date to the removal of the foreign body the father states that the child "was always bronchial and short of breath," and "the noise he made at night was like air passing through a small hole."

On different occasions he would "suddenly get cold and the temperature rise as high as 104°; the attacks sometimes ended with vomiting followed by a sound sleep; then all would be well again until similar symptoms reappeared." In June, 1921, his tonsils, which were much enlarged, were enucleated, because "it was thought that they kept up the bronchitis," but the chest symptoms were in no way benefited by the operation.

Since August, 1921, the attacks of pyrexia occurred every two or three weeks, and especially after any exertion such as walking; in the meantime the appetite was failing and milk became the favourite food. A further consultation was held and the question of removing the appendix was discussed. During June, 1922, the child was so far from improving that Dr. Batty Shaw was then asked to see him, and I append some brief notes which he sent me of the physical signs which he found in the patient's chest. The chief amongst them were "expansion of the chest very poor, nearly all breathing being done by the diaphragm. The right chest, however, expanded a little, but the left, especially in the lower part *in front*, *collapsed* on inspiration; moreover, the left lung behind was dull on percussion, vocal fremitus was normal, and I heard a râle or two."

In view of the history of the case, and that the physical signs were chiefly located in one (the left) lung, Dr. Shaw advised that the chest should be "screened," and Dr. Salmond's services were enlisted. He clearly demonstrated that the foreign body was lodged in the left bronchus with the clips fully spread and pointing upwards (see Special Plate), a condition of things which made the question of removal difficult, not without danger, but nevertheless possessed of fascinating problems to the practical endoscopist.

(I take this opportunity of thanking Dr. Batty Shaw for asking me to help him in the matter.)

Some of the difficulties were obvious. We could be sure that the points of the fastener would be invisible and embedded in the walls of the bronchus. In the early hours of the accident each inspiration would suck downwards and deeper into the bronchus the flat piston-like head of the foreign body, while the expiratory blasts of coughing would force the points of the wings into the soft contracting walls which surrounded them.

Furthermore, it might safely be assumed that the foreign body would be embedded in vascular granulations which would bleed on the slightest touch and thus obscure the small field available for operative manipulations. For the same reason a good deal of time would necessarily be spent in checking the haemorrhage.

Finally, one knew that in a child of 7 years only a tube of narrow calibre could be employed, and through this a long and slender forceps would have to be passed and its grasp directed by monocular vision. In an attempt to neutralize

this last handicap, I spent several hours in removing paper fasteners which were firmly fixed in rubber tubing of a size corresponding to that of the patient's bronchus.

The value of this preliminary practice cannot be overestimated, because there is no limit to the training of co-ordinated movements between the eyes and the fingers. These *must* work in harmony, for although the experienced eye may see the foreign body, if the hand be unskilled its work will frequently end in failure, and too often the extent of this has only been revealed during the *post-mortem* examination on the patient.

Operation.

At 7 a.m. on June 29th a hypodermic injection of 1/100 grain atropine was given, and a second injection of the same amount at 9 a.m.; the object of this was to check the secretion of mucus in the lower air passages. Children tolerate atropine well.

At 10 a.m. Dr. Felix Rood administered open ether until the laryngeal reflex was abolished, and continued with a mixture of chloroform and oxygen during the remainder of the operation. The help he rendered me in many ways was invaluable.

A bronchoscope, modelled on the Chevalier Jackson principle by Irwin Moore, was then passed through the glottis into the left bronchus, and just beyond its distal end a mass of granulations could be seen. To this was applied a small swab of gauze moistened with equal parts of a solution of 10 per cent. cocaine and adrenaline chloride. After an interval of some five minutes I removed an oedematous granulation about the size of a green pea. The oozing of blood and mucus which we anticipated necessitated oft-repeated swabbing, and it was at least ten minutes before a reasonably dry field enabled me to detect the foreign body.

By means of Jackson's side-gripping forceps it was now possible to secure and dislodge the lower point of one wing of the paper fastener and to manœuvre it just within the bevelled end of the bronchoscope. After further bleeding had been checked the second wing was secured, and finally tube, forceps, and foreign body were withdrawn together.

The patient recovered quickly and left the nursing home two days after the operation. I saw him again on July 6th; he appeared to be quite well, and the physical signs in the left lung (vide supra) had practically disappeared.

General Considerations.

1. Probably the first and most important lesson to be learnt from this case, and from so many others of like nature which have been reported, is contained in the history of the symptoms which followed the entry of the foreign body into the lower air passages. It should teach all practitioners that the sudden onset of cough associated with unilateral pulmonary symptoms in a previously healthy child is very suggestive of the inhalation of a foreign body. If this be granted, it follows that no method of examination should be neglected until all doubt upon the point is set at rest.

In the present case the history was clear enough and the patient was "screened," but unfortunately the negative was so defective that it led to the assumption that the symptoms were not due to a foreign body; consequently the treatment of the pulmonary symptoms was ineffectual, and caused much anxiety to the parents on account of the continued ill health of their child.

2. Therefore the second lesson we learn is that it is very unwise to rely on any one method of investigation, and particularly so when the means employed are imperfect. If an expert radiographer had examined the patient in the first instance the diagnosis would have been clear, and the treatment obvious, immediate, and probably successful.

On the other hand, let us suppose that a child is suffering from symptoms very suggestive of the inhalation of a foreign body into the lower air passages, and yet no history of the accident has been obtained. This has often happened in the case of children owing to their nervousness or to the fear of scolding or punishment. Furthermore, let it be assumed that the foreign body is a fish-bone or some substance not impervious to the *x* ray. What course should be pursued? To this question there is only one answer—namely, look and see; and herein lies the inestimable value of the bronchoscope, both from the point of diagnosis and immediate treatment.

3. One more word about symptoms. Violent fits of coughing, unilateral emphysema, and localized fine crackling râles are common and early signs of the accident under discussion. These will vary with the nature, situation, size, and shape of the foreign body, and their severity may alter from time to time if there should be any alteration or shifting of its position. Later on the symptoms may take the form of pulmonary collapse, consolidation, abscess, bronchiectasis, pleurisy, or the physical signs and constitutional disturbances may closely simulate those of tuberculosis, excepting the presence of the characteristic bacilli in the sputum. It would be nearly true to say that bronchiectasis in children is always caused by a foreign body. In adults such a factor is more likely to be overlooked or forgotten, as in a case reported by me in the *Lancet* of April 22nd, 1911, where a large piece of mutton bone had been impacted in the right bronchus for three years!

4. It will have been noted that the paper fastener lodged in the left bronchus, whereas most foreign bodies pass into the right because it is larger and more in the direct line of the trachea. From the same situation (left) I have removed two shawl pins, the cap of a lead pencil, and a portion of shrapnel casing (vide author's *Diseases of the Nose and Throat*, Lewis and Co.).

Anaesthetic.

My American colleagues may ask why a general anaesthetic was employed when Chevalier Jackson is able to report hundreds of consecutive cases successfully treated without any anaesthetic, local or general. My answer is that he is able to command the services of trained nurses and assistants who know his instruments, how these should be arranged for the operation, and how to clean them afterwards without ruining them. They understand the preparation of the patient before the operation and how to fix, immobilize, or alter the position during the operation. Each has his or her particular duty to be shared by no one else. They are the specialists of their profession, and happy is the surgeon who can command their services.

Such team work seems impossible in this country, even if there were sufficient material to make its organization worth while, and up to the present one has failed to persuade certificated nurses to confine their attention to, and become experts in, any one branch of work.

In consequence the endoscopist is driven to general anaesthesia in order to have his patient under complete control, and fortunately we enjoy the services of highly skilled anaesthetists who secure this end with the minimum of risk; at the same time they render the patient oblivious of what must often be a very uncomfortable and distressing experience.

This is scarcely the occasion to describe the technique and delicate manipulations which were employed to remove the foreign body in this particular patient. They will be familiar to experts but more or less devoid of interest to the average reader. Bronchoscopy is an art which bristles with important details. Its practice demands a degree of patience and gentleness not excelled by the expert angler with his dry fly. To grope blindly or to use force and lacerate delicate tissues which are often bathed in septic secretions is to betray a great trust and to show small respect for the sanctity of human life.

It will suffice to say that I used a Jackson bronchoscope—that is, with the little electric lamp at the distal end of the tube—and was therefore freed from the top-hamper of the proximal light carrier of Brüning's instrument, which is still in common use in this country and on the Continent.

In conclusion, it seems a fitting opportunity for acknowledging the debt which endoscopists owe to Chevalier Jackson of Philadelphia, U.S.A., for his work in this department of medicine. Speaking for myself, and putting aside my appreciation of his many acts of personal kindness, it is impossible to appraise the value of his inventive genius or of his inspiring enthusiasm. Nor can the written word express my admiration and envy of the quiet but unrivalled skill with which he uses the instruments which bear his name.

THE next meeting of the Czech Tuberculosis Society will be held at Prague in the spring of 1923. This society was founded in 1920 for the purpose of promoting research in tuberculosis. Various scientific problems in connexion with the subject are being studied in the medical department of Prague University.

A POST-GRADUATE course in diseases of women and heart disease, lasting four days, was given at Franzensbad during the third week of September. In the following week a post-graduate course was held in Carlsbad; the lectures covered a number of different subjects, including diseases of the abdominal organs and disorders of metabolism.

A CASE OF ARSENICAL KERATOSIS FOLLOWED BY CANCER.

BY

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[*With Special Plate.*]

THE late development of epithelioma on a pre-existing basis of hyperkeratosis produced by prolonged arsenical medication is a rare phenomenon, and MacLeod,[1] in his textbook of skin diseases, states that only about fifteen authentic cases have been recorded in the literature. The part played by arsenic in the production of cancer has been disputed in some quarters,[2] on the ground that malignant disease is apt to develop in patches of psoriasis, etc., in which the drug has never been administered. If this objection be conceded, there still remain cases in which it was given over a prolonged period for conditions other than dermatological and in which epithelioma of the skin subsequently occurred.[3] The argument is really beside the point, for most authorities are now agreed that the etiology of such growths is multiple, and that arsenic may be regarded as a predisposing factor of malignant degeneration, in virtue of its property of producing hyperplastic growth in surface cells, which are particularly exposed to traumatic and irritating influences, such as sunlight, variations of temperature, dust, friction, and recurring physical stimuli of all kinds.

Carcinoma linguae, from the etiological point of view, is more strictly akin to "arsenical" cancer than are "tar" or "*x*-ray" cancer, for in these the predisposing factors are local, while in the former two they may fairly be regarded as systemic (that is, syphilis, which produces leucoplakia, and arsenic, which produces an almost identical histological condition—hyperkeratosis). The credit of priority in the discovery of the relationship under discussion belongs to Jonathan Hutchinson, and the evidence which he first brought forward in 1887[4] has since accumulated and received confirmation from the pens of such well-known dermatologists as Dubreuilh,[3] Darier,[5] and Hartzell,[6] while, among the surgeons, Bland-Sutton[7] published a case in this JOURNAL as recently as 1916.

The possibility of an impending increase in the incidence of the disease, as a result of the world-wide injection of arsenical compounds for syphilis, yaws, etc., has been raised by K. Ullmann.[8] Salvarsan dermatitis, however, is an acute eruptive condition which tends to a *restitutio ad integrum*, and does not go on to keratodermia, which is the necessary preliminary to epithelioma.

Most of the cases of arsenical keratosis reported have followed the oral administration of the drug, but the dosage and the duration of treatment were by no means constant. In the cases published by Dubreuilh[3] a keratosis of the palms and soles was noted as early as six months from the date of commencing the treatment, but the average incidence of cutaneous change is about two years, and the usual dose given has been from 15 to 30 minims of Fowler's solution thrice daily. The same author states that gastric and intestinal intolerance are danger signals, and that the occurrence of pigmentation, which usually precedes the development of keratosis by some weeks, is an absolute indication for cessation, or at least a prolonged intermission, of the drug. My own case conforms in every particular with the classical picture first enunciated by Hutchinson.

The patient, aged 40, who was referred to me by Dr. H. C. G. Pedler (London), had a more or less generalized psoriasis at the age of 12, and as the eruption was controlled by arsenic he persisted with its administration, and without further medical advice, for seven years. By this time (1901) pigmentation of the abdomen and warty growths on the palms and soles had developed, and his father consulted Sir Malcolm Morris, who at once recognized the cause, and forbade any further treatment with arsenic in any form. In 1905 he consulted the late Sir Lauder Brunton for oedema of both feet, one wrist, and the dorsum of the left hand.

In 1914 (that is, fourteen years after cessation of the drug) the hyperkeratosis on palms and soles was as obvious as ever, and a small painless ulcer made its appearance in or around one of the warty growths on the outer border of the right sole. The ulcer persisted, and was not regarded as serious apparently, for from February until July of the current year (1922) he received treatment by ionization in a country town. The size and appearance of the neoplasm, when I saw him on August 16th, is so well illustrated in the accompanying photograph (Special Plate, Fig. 1) as to need no further description. The associated plantar and palmar keratosis is also clearly depicted (Figs. 2 and 3), and it only remains to say that the skin as a whole was remarkably dry, free from any abnormal pigmentation, showing a trace of psoriasis on the knees, elbows, and chest only. A slight degree of oedema, which pitted on pressure, and was therefore subcutaneous and not confined to the epidermis, was noted on the dorsal aspect of both feet.

The right leg was amputated through its lower third by Mr. T. T. Higgins on August 18th, and recovery was uneventful.

As in a somewhat similar case reported by Sir John Bland-Sutton,[7] no glands, either in the popliteal space or in the groins, could be regarded clinically as containing malignant deposits. Bland-Sutton writes (loc. cit.): "It is said this form of cancer does not reproduce itself in the lymph nodes."

The histological appearance of the tumour is reproduced in the microphotographs (Figs. 4 and 5), and I am greatly indebted to Dr. G. W. Nicholson, of Guy's Hospital, for the following note on its structure:

"1. A squamous-celled carcinoma with extensive keratinization and formation of cell nests. The stroma is loose and oedematous, and contains numerous areas of inflammatory reaction. At its periphery the section is covered by hypertrophied epidermis, with lengthened irregular papillae. Its centre is ulcerated, the base of the ulcer being occupied by granulations, most of which possess a covering of squamous epithelium obviously derived from the cells of the neoplasm itself. There is extensive infiltration of the cutis and subcutaneous tissues by columns of new growth, some of which are definitely within lymphatics.

"2. A section through a keratodermic nodule shows a strip of skin with irregular papillae, a well-marked stratum granulosum, and a greatly hypertrophied stratum corneum. The cutis and superficial layers of the subcutaneous tissue are fibrotic, the walls of the small blood vessels much thickened, and the sweat glands and their ducts small and atrophied."

The presence of thickened blood vessels noted by Dr. Nicholson affords a possible clue to the persistent oedema of the feet, and the paucity of sweat glands and the atrophy of their ducts doubtless account for the general xerodermia. The thickened blood vessels—the Wassermann reaction being negative in this case—may be presumed to have followed a preceding endarteritis, such as has often been described in the *post-mortem* records of the brains from fatal cases of salvarsan poisoning. If this theory is correct, it is not difficult to explain the oedema which is the result of the transudation of lymph through endothelium damaged or paralysed by the action of a protoplasmic poison.

Summary.

1. The case illustrates the danger of prolonged arsenical medication by the mouth.

2. Where keratosis has occurred as a result of this the drug must be immediately suspended, and every effort made, by keratolytics, *x* rays, etc., to destroy the small warts and check their continued formation, and their pronounced tendency to spontaneous degeneration and necrosis.

3. For a growth of the size depicted there is, of course, no effective treatment other than amputation. The site of the removal will depend on the situation of the tumour, the presence of infected glands, and other considerations of surgical importance.

For small growths of recent appearance, without evidence of gland infection, the treatment by *x* rays or radium should receive a trial. Local excision is not recommended.

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THE first course of lectures under the Charles E. Dohme Memorial lectureship was given at the Johns Hopkins Hospital, Baltimore, on October 10th, 11th, and 12th, by Dr. H. J. Hamburger, professor of physiology at the University of Groningen, Holland. The lectureship was established in memory of the late Mr. Charles E. Dohme, a well-known chemist of Baltimore, and its purpose is to promote the development of a more intimate relationship between chemistry, pharmacy, and medicine. The lectureship, which is of the annual value of 1,000 dollars, is open to scientists from any part of the world, and the selection of a lecturer is made by a committee representing the departments of pharmacology, chemistry, and medicine of the Johns Hopkins medical school.

PUERPERAL INFECTION MORTALITY IN WALES.*

BY

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[Dr. Maclean, having traced in considerable detail the historical basis upon which our present knowledge of puerperal infection rests, and having discussed the questions of definition and classification, continued:]

It would not be consonant with the title or purpose of this paper to pursue in detail the etiology and pathology of puerperal infection, but some consideration must be given to the important questions of its frequency and distribution.

Arnold Lea, writing in 1910, drew attention to the fact that the reports of the Registrar-General showed that in the British Isles during the previous forty years the mortality from puerperal infection had but slightly diminished, notwithstanding the revolution which had occurred in surgical practice by the application of the principles evolved by Pasteur and Lister. The lying-in hospitals only participated in the betterment so far as midwifery was concerned, and in these institutions the mortality had been reduced to a minimum. Taking a quinquennial period of seventy years ago the puerperal death rate from all causes was 4.9 per 1,000 births, as compared with 4.2 for a similar period of sixteen years ago, and deaths from puerperal infection account for 50 per cent. of these rates. The Registrar-General's report for 1920 makes reference to the tale and toll of the intervening years.

In 1920 the number of deaths assigned to pregnancy or childbirth corresponded to a rate of 4.12 per 1,000 births, as against an average rate of 3.78 in the ten years immediately preceding and 4.12 for 1919.

The lowest level reached was 3.55 in 1918, so that the increase to 4.12 in 1919 and 1920 has been sudden as well as considerable, and when distinction is made between deaths ascribed to *septic* and to *other causes* it emerges that the increase is almost entirely due to sepsis, the rate for which is higher in 1919, and still more so in 1920, than in any of the preceding ten years. It may be significant or merely coincidental that the erysipelas mortality of 1920 is the highest since 1915.

The chief medical officer of the Ministry of Health in his report for 1921 is able to indicate some improvement in the number of deaths from puerperal sepsis as well as from other causes, the inclusive rate being 3.9 per 1,000 births, as compared with the 4.1 already quoted for the two previous years. He adds:

> "The fact that in England 3,323 mothers lost their lives on account of childbirth last year cannot be regarded without grave concern. It is a matter which should receive the careful and continued consideration of teachers and practitioners of midwifery and of all responsible for making due provision for the mother at the time of her confinement."

Of the total number of registered births in England 54 per cent. were notified by midwives, and he points to the obvious importance of a high standard of practice by midwives being encouraged, and to that end recommends that in all districts, urban and rural, there should be an adequate number of competent, sufficiently remunerated, and, where necessary, a subsidized service of midwives. He stresses the importance of ante-natal supervision and urges the provision where possible of lying-in accommodation, not only for abnormal cases but for women who cannot safely be confined at home. But lest, like Mark Twain in his classic lecture on the Babes in the Wood, I should be guilty of saying nothing connoted by the title of the paper, I must focus the foregoing in its application to conditions prevailing in the Principality.

A recognized authority on the geographical distribution of puerperal infection in England and Wales—the late Dr. William Williams, the distinguished medical officer of health for the county of Glamorgan, whose friendship many of us were privileged to enjoy—found that the puerperal septic death rate varied from 1.4 to 3 per 1,000 in different centres, the maximum being reached in Lancashire and Wales, while many of the counties were represented by a figure below 1.4.

Deaths from accidents in childbirth, however, are most numerous in agricultural districts with a scattered population, and reach the minimum in London and its surrounding counties. This is generally attributed to the greater availability of skilled assistance in emergencies in the more densely populated districts.

Dr. Williams studied in detail the distribution of mortality in South Wales, and found that infection occurred most frequently amongst women attended by ignorant or untrained midwives, and that density of population, climatic conditions, and even the presence of zymotic diseases, such as scarlet fever and diphtheria, had little influence. Dr. Williams, as well as subsequent writers, and, indeed, every authoritative report dealing with the matter, draws attention to the exceptionally high puerperal mortality among women in Wales. In one period, when the average mortality from childbirth and childbed in London was 3.9 per 1,000 births and in England and Wales 4.7, the figure for South Wales was 6.1 and for North Wales rather higher still. And again, in the puerperal mortality census for England and Wales, 1911–14, when the mortality rates per county were indicated by degrees of shading, there were only two black counties, both of which were in Wales—Cardigan and Merioneth—the qualification of a black county being that as many as 8.9 mothers died per 1,000 births. In the latest report (1920) of the Registrar-General the figures show that in the maternal mortality rate per 1,000 children born alive Wales is definitely higher than any or all parts of England, and, therefore, than the combined rate for England and Wales. This applies to county boroughs (5.79—England and Wales 4.42), urban districts (5.27—England and Wales 4.46), and rural districts (5.77 England and Wales 4.54), the consolidated Welsh rate being 5.52 as against 4.33, the average for England and Wales. For puerperal deaths due to sepsis the Welsh rural districts still hold, unfortunately, an outstanding position in the whole of England and Wales (2.22 per 1,000 live births, as against England and Wales 1.68).

I am indebted to Dr. Llewellyn Williams, of the Welsh Board of Health, for his kindness in furnishing a map and recent figures indicating the prevalence of puerperal infection in Wales, notifications received in connexion therewith, and the deaths ascribed thereto. There can be no doubt that many cases of puerperal infection are not notified, and that this is especially so in the rural districts. I have gladly accepted Dr. Llewellyn Williams's courteous invitation to co-operate with himself and his able staff in an investigation into the whole of this urgent problem.

Dr. W. Williams, in a communication on puerperal mortality to the Epidemiological Society of London in 1896, deals with many points common to the disease occurring anywhere and with some points having especial bearing on conditions in Wales. At to the higher mortality of puerperal infection in primiparae, he relates that in an epidemic investigated by him no less than 75 per cent. of the primiparae affected died.

Attention is drawn to the excessively high puerperal infection rate in Merioneth and Cardiganshire—two typical instances of purely agricultural and hilly counties—as compared with a low rate in Pembroke, Anglesey, and Radnor, also purely agricultural but comparatively flat. The mining county of Glamorgan and the mixed mining and agricultural counties of Carmarthen and Carnarvon show a mean rate.

Of the counties, Glamorgan alone may be called "densely populated"—that is, with less than one acre per person. Flint had less than two acres, while the remainder may be termed "sparsely populated." The figures quoted tend to show that density of population is not a factor of much importance in determining puerperal infection, but rather that the higher mortality from both sepsis and the accidents of childbirth prevails in those counties which are mountainous, hilly, and sparsely populated, and where, consequently, locomotion is tedious and medical assistance difficult to obtain.

The Registrar-General of forty-five years ago said in one of his reports: "In North Wales, where the mothers are left to nature or to unskilful old women, the mortality is double that of London, and 9.4 mothers die to 1,000 children born." Dr. Williams admitted there was much truth in this remark, and that it was within his knowledge that in the counties of Merioneth and Cardigan, so prominent in their mortality rates, most of the confinements among poorer women were attended by untrained women; that similar conditions obtained in all the county districts, villages, and small towns of

* Presidential Address to the Cardiff Medical Society.

Wales; and that in Glamorgan puerperal infection was often spread broadcast in this manner.

When first appointed medical officer of health to the county of Glamorgan he was called upon to investigate an epidemic of puerperal infection in the Garw and Ogmore valleys, in both of which, and especially the Garw, the disease had acquired the reputation for years of being almost endemic. The two valleys are certainly topographically distinct, and at that time, at all events, there was no appreciable interchange between their midwives. On the basis of his investigations and the experience of a local practitioner he makes the interesting statement that the majority of cases confined in houses infected with scarlet fever escape puerperal infection, and that if occasionally a lying-in woman takes scarlet fever she does not develop puerperal infection symptoms and generally recovers. One of Dr. Williams's observations recalls the saying of Gordon of Aberdeen: "The infection in this disease is most subtle, persistent, and portable, and more difficult to get rid of than in almost any other disease."

Many further facts and figures might be furnished to support the view that in Wales the subjects of puerperal mortality, and especially of puerperal infection, still afford an outstanding problem which all bodies and persons executively concerned should strive to solve. Ultimately I believe the great betterment will come along the lines recommended in the second report of the Welsh Consultative Council, but meanwhile much can be done by the intelligent and conscientious observance of preventive measures and by the harnessing of the new facts which evolve from laboratory and clinical research.

Preventive Measures.

The range of prophylaxis must include pregnancy, labour, and the lying-in period.

1. *During pregnancy* attention should be directed to the general health, urinalysis, personal hygiene, and the careful treatment of erythematous or eczematous conditions of the vulva, vaginitis, or fistula in ano, etc. Particularly in primigravidae a systematic pelvimetric examination is of the greatest importance.

2. *During labour* the selection and preparation of the lying-in room and the exclusion of all persons suffering from diseases such as tonsillitis or any form of septic infection call for attention. The arrangement of the bed and the preparation of the patient, her clothing, and detailed disinfection of the vulva as the centre of the "field of operation" are of the utmost value. As regards vaginal douching, this practice in normal labour is unnecessary and may be harmful, the essential point being to carry out complete antisepsis of the vulva. Too much importance cannot be attached to the disinfection of the hands and the intelligent use of rubber gloves. The number of vaginal examinations during labour should be limited by real requirement, and the same comment applies to the number of obstetrical operations, including not only instrumental interference, but the most dangerous of all obstetrical operations, the manual removal of the placenta, involving, as it does, the definite risk of the direct inoculation of organisms on the placental site. There are instances, of course, where that risk must be accepted—as, for instance, in *post-partum* haemorrhage or cases where full time has been allowed and where the various methods of expression have been thoroughly tried without effect. The retention of a small portion of membrane within the uterine cavity does not in itself justify manual exploration. Vaginal or intrauterine douching after normal labour is not called for, but should be practised only when there is reason to surmise that by hand or instrument organisms have been introduced. The repair of injuries produced during delivery should be undertaken with the fullest regard to aseptic and antiseptic precautions.

3. *After delivery.* A careful ritual observed during labour is too often relaxed or abandoned forthwith, whereas the maintenance of asepsis is of prime importance, and this involves the carrying out of general and local measures to that end; especial danger attaches to careless sponging of the vulva, and, as far as possible, all manual interference with the vulva or vaginal orifice during the early days of the puerperium should be avoided.

There is but time to put forward these few indications on preventive lines and to add that we, and all others interested in this profoundly important topic, must feel that there is much yet to be learned both at the bedside and in the research laboratory, and that the improvement we seek on behalf of the community, and in particular on behalf of Wales, "can only be brought about by a full appreciation of all that is known of the etiology of the disease, and an adequate sense of the responsibility on the part of all those brought into relation with the lying-in room."

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

"HAEMORRHAGIC" CHICKEN-POX.

By the courtesy of my colleagues, Dr. Alexander and Dr. Binns (the latter being in charge of the patient), I am able to submit the following notes of an interesting and very unusual case of chicken-pox.

A girl child, aged 3, was seen to be sitting up in bed eating a piece of cake; she was to all appearance perfectly well. Pulse 84, respirations 16, temperature normal. Urine clear, stools normal. Without any initial illness there had appeared some spots on her skin on November 3rd, which by November 5th had turned black. On November 6th these spots were noted to present the following approximate number and appearance: right hand 3, right forearm 9, right arm 18; left hand 4, left forearm 9, left arm 15; face 34; front of chest and abdomen 36. There were less than 150 lesions on the whole skin.

One lesion, selected for close examination, was situated near the apex of the right scapula. It was crenate in outline, irregularly lozenge-shaped, its long axis being parallel to the natural folds of the skin in this region; the appearance was exactly that of a chicken-pox vesicle recently collapsed, except that the contents were now perfectly black, and apparently consisted of dried blood. Immediately around the vesicle was an area of pale crimson skin, which in its turn was surrounded by a faint purplish area, having much the appearance of a recent bruise. The whole of this area of discoloration measured about 14 by 15 mm.; it was covered by a half-sovereign. Nearly every complete lesion was surrounded by a similar ecchymosis, and some of the aborted lesions showed a very slight but unmistakable discoloration around them. There had been epistaxis. There was a bruise under the left eye on the upper part of the cheek. No subconjunctival haemorrhages were noted. There were three black spots on the tongue, one on the lower lip. Both labia majora were ecchymosed, the left markedly so.

The child was seen again on the following day (November 7th), and her somewhat anaemic condition was remarked. Otherwise she appeared to be well, and was giving all her attention to her toys. A small subconjunctival haemorrhage was noted in each eye. The left eye was surrounded by ecchymoses or bruises apparently associated with spots. Numerous brownish bruises were noted on the right leg and some on the right arm.

The case was unquestionably one of chicken-pox of mild degree, as well as could be gauged from the number of the spots and the absence of constitutional symptoms. It seemed probable that some idiosyncrasy in the child, of which this was perhaps the first intimation, had led to these haemorrhages and bruises. I have heard of one similar case, in the person of a lady in middle life who had an attack of chicken-pox, but do not know whether she suffered from haemophilia or not. I should like to hear of similar cases.

London, S.E. W. McC. Wanklyn.

POTASSIUM PERMANGANATE IN DERMATOLOGY.

The treatment of skin diseases by potassium permanganate as advocated by S. Feldman and B. F. Ochs in the *Archives of Dermatology and Syphilis*[1] is not in any way a new form of treatment.

My friend and teacher Dr. Douglas Heath of Birmingham has been using potassium permanganate quite extensively for a number of years, not only for the skin conditions mentioned by Feldman and Ochs, but also and chiefly for the treatment of the moist type of lupus vulgaris, which it dries up in a very short time. For these cases Dr. Heath advocates the use of a saturated solution of potassium permanganate. Personally I have been using with very satisfactory results an alkaline potassium permanganate paint in the treatment of Bockhart's impetigo. I use the following solution:

℞ Pot. permang.	... ...	gr. xv
Sod. bicarb.	... ...	gr. x
Aquam	... ...	℥j

It is applied once a day to the lesions and skin around them after letting the pus out with a needle.

Birmingham. James Avit Scott.

[1] British Medical Journal, Epitome, November 4th, 1922, p. 334.

Reports of Societies.

PERNICIOUS ANAEMIA.

A DISCUSSION on pernicious anaemia took place at the meeting of the Medical Society of London on November 13th. The President, Lord DAWSON OF PENN, was in the chair.

Dr. P. N. PANTON, in opening the discussion, said that he, with two colleagues, had succeeded in collecting 117 cases from the records of the London Hospital over a period of eleven years, and all but sixteen of these cases had been followed up. Pernicious anaemia was an uncommon, but not a rare condition. It ran a characteristic course, almost invariably fatal. Medicine had little or no control over the chronic condition, it appeared to play no part in the rare cases of recovery, and probably the treatment of the more characteristic cases had even less influence on their course than those in charge of them supposed. The underlying factor was hidden; it might be a single entity or a group of conditions. Pernicious anaemia was a condition of severe anaemia, to be explained neither by the history obtainable from the patient nor by a study of his clinical condition. The haemolysis was slow and continuous, and associated with the clinical condition was a characteristic blood picture, of which the main features were a severe loss of red cells (and certain changes in the cells) without a corresponding great loss of haemoglobin. It was this combination of the clinical study and the blood picture which rendered the diagnosis relatively simple. Complicating conditions were very rare, with the exception of subacute combined degeneration of the cord. There were certain definite and constant *post-mortem* changes. Associated with the clinical study were oral sepsis, achylia, and pyrexia. There was no striking evidence that oral sepsis was an etiological factor. Many of the patients with whom he had had to deal received the most thorough dental treatment, with disappointing results. Not a single case recovered as a result of the treatment of the dental sepsis. Achylia had attracted considerable attention. Pernicious anaemia might occur, though rarely, without achylia. A severe secondary anaemia, particularly if prolonged, might be associated with achylia, and if that secondary anaemia was cured the achylia might still persist. Too much attention should not be paid to achylia as a possible cause; rather he would regard it as part of a vicious circle. Conceivably it might be an important predisposing factor. Pyrexia was an extremely constant accompaniment of pernicious anaemia. It was present at one time or another in ninety of the cases included in his investigation. As a rule it coincided with exacerbations of the disease. This fact had been used as an argument for an infective agent, but the haemolysis which was going on would alone be sufficient to account for the fever. As for treatment, it was, of course, desirable that the oral sepsis should be attended to, but he was against any wholesale extraction of teeth. Of two patients shown to the Society that evening, representing two of the very few successful cases, one had marked pyorrhoea still present, and the other still had carious teeth. Vaccine treatment was practically of no value. Benefit came to the patient by treating his achylia. Treatment by splenectomy never seemed to the speaker to have any theoretical or practical justification. In his cases it was performed only in one, and the patient lived for three years afterwards. A few cases were treated by blood transfusion; this was a course which should only be adopted for some specific reason. One lady, for instance, much desired to live to see her son, who was returning from abroad, and her life was prolonged for six months by blood transfusion. It was possible that the value of treatment by arsenic had been overestimated; its apparent efficacy might depend upon the period in the "wave" of the disease at which it was administered. He described a number of conditions allied to pernicious anaemia, in which the connecting link was internal haemolysis, and in all of which the blood picture of pernicious anaemia was closely simulated.

Dr. A. MAITLAND-JONES, who was associated with Dr. Panton in this investigation, gave further details of the 117 cases. It appeared that the average number of remissions in each case was about two; if the number exceeded two it might go on to five or six. The average duration of remissions was about four months; a longer period than four months was uncommon, a longer period than nine months very rare. The average red cell count when the patients came into hospital was 1,300,000, and when discharged on remission 2,400,000. It might be supposed that the blood count approached somewhere near to normal during remissions, but this was not so. The recovery of the blood was not so marked as might be expected. The number of red cells during the remission period rarely exceeded 3,500,000. Yet the patient was greatly improved, and it seemed as though his feeling of well-being during remission was not so much dependent on an increase in the red cells as on an increase in blood volume. A number of cases had no remissions at all. This applied in 18 out of the 101 cases which had been followed up; the average duration of these cases was nine months from the beginning of symptoms. The average duration of the whole 101 cases from the beginning of symptoms was twenty-eight months, and from the time of admission to hospital thirteen months. Of these 101 cases 93 were dead. Of the 8 which were alive, 1 had been alive for seventeen years, 1 for fourteen years, 2 for eight years, 2 for seven years, and the others for shorter periods. One man who was brought before the Society that evening was an apparent cure; he was admitted thirteen years ago into the London Hospital, when his red cells were 700,000, and he had complete achylia. His blood count was now 5,000,000, and he still had complete achylia. Another case, a woman, was an example of arrested disease. Her blood count was 1,300,000 in 1909, and at the present time it was 4,400,000.

Dr. A. F. HURST devoted himself to a consideration of the part played by achlorhydria in the pathogenesis of pernicious anaemia. He believed that achlorhydria was almost invariably the predisposing cause. It had been suggested that it was secondary to the anaemia, but he had collected twelve cases in which it was known to have preceded the onset of anaemia by periods varying between one and twelve years. Moreover, it had been found in the early stages of the disease when the haemoglobin percentage was still as high as 80. There was nothing specific about the achlorhydria which disposed to pernicious anaemia, as it was the absence of free hydrochloric acid, and not the cause of this absence, which was the important factor. In the majority of cases the achlorhydria was probably due to constitutional achylia gastrica—an inborn error of function. Several authors had lately drawn attention to the occurrence of pernicious anaemia as a family disease, and it seemed probable that achylia was the inherited factor. The absence of gastric juice resulted sooner or later in secondary chronic gastritis, and, even after many years, in partial atrophy of the mucous membrane. But these were secondary to, and not the cause of, the achylia, which was just as complete in the absence of all pathological changes as it was with severe atrophic gastritis. In considering the possibility of subacute combined degeneration of the spinal cord being associated in rare instances with cancer of the stomach, Bell and he had suggested that if this ever really occurred it would probably be in one of the 50 per cent. of cases of gastric cancer which were accompanied by achlorhydria, when it would be secondary to the latter, and not due directly to the cancer itself, and that it would also certainly be associated with pernicious anaemia. Achlorhydria not only favoured infection of the intestine, but it resulted in the arrival in the intestine in an unaltered condition of proteins taken in the food. The result was that the digestion of protein, though eventually complete, was delayed, and an undue proportion remained in the lower part of the ileum in a form in which it could undergo bacterial decomposition. Thus achlorhydria not only predisposed to intestinal infection, but it resulted in the provision of material which was likely to form toxins, one of which might be presumed to be haemolytic and the cause of the anaemia, another a neuro-toxin causing subacute combined degeneration of the cord, and possibly a third acting upon the bone marrow and causing it to form an abnormal type of red cell. Every patient with achlorhydria should be regarded as a potential case of pernicious anaemia. Hydrochloric acid should be given in adequate doses at every meal for the rest of the patient's life, and his teeth should be put in perfect order, and kept so by periodic treatment. The treatment of pernicious anaemia should consist in radical treatment of the oral sepsis, the administration of hydrochloric acid, the regular use of sour milk, and inoculation with a vaccine prepared from streptococci isolated from the patient's own duodenum by means of a Ryle's tube. In most cases 1½ to 2 drachms of dilute hydrochloric acid added to 4 or 6 ounces of water to make a strength equivalent to that of the gastric juice was required to produce an approximately normal curve of acidity with a fractional test meal. If lemon

juice and sugar were added the mixture made a palatable beverage. In most cases symptomatic treatment was also required for the anaemia, and he was inclined to recommend transfusion, and possibly splenectomy, in addition to the usual arsenic. With early diagnosis the prospects of successful treatment on those lines were favourable.

Dr. J. J. Conybeare said that the records of all cases of pernicious anaemia at Guy's since 1850 had been collected. Dr. French brought the series up to 1909, and Dr. Campbell and himself completed it to the beginning of the present year. The records suggested that the disease had become more common. During the period 1909–22 the average number of cases in the hospital each year was 5.4, whereas when the records were first taken the number was only 1 per annum. In the cases which he and his colleague had collected during the last fourteen years some gastro-intestinal symptoms, either vomiting, abdominal pain, or diarrhoea, occurred, concurrently with the development of anaemia and before the patients had anything in the way of arsenic, in 35 per cent. Pigmentation was present in a great many more cases than was expected. Dr. French's cases, tabulated earlier, showed 18 per cent. to have pigmentation in the skin and 3 per cent. in the mouth. In the later cases, excluding all pigmentations due to arsenic, 12 per cent. had pigmentation on the skin and 5 per cent. in the mouth.

Dr. C. Price-Jones showed diagrams to illustrate the great variations in the size of the blood cells in pernicious anaemia. In healthy persons the red cells were homogeneous; in pernicious anaemia they were heterogeneous. In this condition the basic thing was the formation of large cells which were readily haemolysed, and it was this haemolysis which gave rise to the anaemia.

Dr. H. L. Tidy mentioned a unique case which he had recently seen. At the autopsy, on the femur being cut through a sharp dividing line was discovered in the bone marrow, on one side of which, when examined through the microscope, there was an evident condition of pernicious anaemia, and on the other side one just as evident of aplastic anaemia. The same curious condition was found in the ulna and other bones.

Dr. F. J. Poynton referred to the question of anaemia gravis in children, which many authorities looked upon as aplastic anaemia, but which closely resembled pernicious anaemia in adults. What was called an aplastic anaemia in children was not purely aplastic. This disease advanced in waves and went back again, just as in adult pernicious anaemia. If it was essentially a pernicious anaemia in the young, one must eventually learn something from a study of its special features, and if it was a different disease it was equally worthy of study in relation to the other. He believed that the proper study of all these blood affections was to some extent hindered by a continued adhesion to blood pictures.

Sir Percy Bassett-Smith said that in sprue (which had been mentioned by one speaker) there was an extremely low red cell count; but sprue differed from pernicious anaemia in that the colour index was low, so that it was true secondary and not primary anaemia.

Dr. George Riddoch gave some account of the neurological manifestations and of the histological evidence *post mortem* of gross lesions found in the spinal cord, mainly, but not exclusively, in the mid-thoracic portion. Subacute combined degeneration of the cord, which had been associated by clinicians with pernicious anaemia, might appear with little or no evidence of blood changes. On the other hand, cases with gross changes of the blood might go through all the stages to death without any gross manifestations of cord involvement.

Dr. M. E. Alexander referred to the introduction in America of germanium dioxide as offering a possible method of treatment, being less toxic than arsenic, and causing in laboratory animals a distinct rise in the number of blood cells. He had employed this in six cases, and while theoretically it ought to be of use, practically the results were negative, and, as the new remedy was expensive, it was as well to put this on record.

Dr. Panton, in a brief reply, referred especially to children's anaemias. The diagnosis of blood diseases in children was extraordinarily difficult. He had never been able to convince himself that he had seen a case of pernicious anaemia in a child under 12 years of age. He would consider a low colour index to be a great argument against these children's anaemias being regarded as pernicious. He agreed that not too much should be made of the blood picture, but unless a very careful blood picture was made there would be a great deal of clinical confusion.

HYDROCEPHALUS.

At a meeting of the Edinburgh Medico-Chirurgical Society held on November 2nd, with the President, Sir Robert Philip, in the chair, Mr. John Fraser and Dr. N. Dott read a communication on hydrocephalus. The normal anatomy and physiology of the parts were first described. The cerebro-spinal fluid was produced from the choroid plexus and from the perivascular spaces. It was absorbed normally by the Pacchionian bodies, the arachnoid villi, the arachnoid mesothelial cells, and by the cortical lymphatics. The three possible factors at fault were overproduction of fluid, blockage of its channels of circulation, or diminished absorption. With the exception of the true congenital type the condition was always due to blockage, the seat of obstruction being either inside the ventricular system or between the crura and the edge of the tentorium cerebelli; overproduction of fluid practically never occurred. Factors in the etiology were birth haemorrhages, pressure by tumour, congenital syphilis, and basal meningitis. It was necessary to investigate the origin of the condition, whether the block was intra- or extra-ventricular, and if intraventricular the actual seat of obstruction. A solution of phenolsulphonephthalein was injected into the ventricles, and lumbar puncture was carried out twenty minutes later, the presence of colouring matter showing that the lesion was extraventricular, its absence that it was intraventricular. If intraventricular the seat of the lesion was determined by ventriculography, oxygen being used to replace the cerebro-spinal fluid withdrawn. X-ray examination of the head in different positions showed whether the obstruction was situated in the aqueduct, the foramen of Monro, or in the roof of the fourth ventricle. The operative treatment was described in detail. In extraventricular cases ligation of the carotids was stated to be the best treatment. The communication was illustrated by lantern slides, and cases which had been under treatment were shown; the oxygen apparatus was also demonstrated.

Professor Edwin Bramwell spoke of the value of ventriculography in the diagnosis of cerebral tumour. He described a case in which a woman, after an illness of ten days, had died with cerebral symptoms, a simple cyst of the choroid plexus blocking the foramen of Monro being found *post mortem*. Dr. Claude B. Ker referred to cases of cerebro-spinal meningitis in which large amounts of fluid were withdrawn by repeated puncture, and expressed the view that in these cases there was overproduction of fluid. Mr. D. M. Greig and Miss Herzfeld emphasized the importance of syphilis in the etiology and the value of novarsenobillon in treatment. Dr. Traquair and Dr. J. S. Fraser also spoke, and Mr. John Fraser replied.

Influenza, Encephalitis, and Cerebro-spinal Meningitis.

Dr. Alexander James then read a communication on some etiological considerations in influenza, cerebro-spinal meningitis, and epidemic encephalitis. Dr. James believed that recent outbreaks of influenza were simply recrudescences of the epidemic which began in 1889. Charts of the mortality and notification records were shown demonstrating the close relationship which the cerebro-spinal meningitis epidemics of 1907–08 and 1914–19 had with the various outbreaks of influenza since 1889. The similarity was less striking now than formerly, since epidemic encephalitis had been recognized as distinct from cerebro-spinal meningitis. Epidemics of these two conditions often occurred together and had many symptoms in common. The inference was that their etiology was similar. Referring to the frequency with which outbreaks of these diseases were associated with outbreaks of influenza, Dr. James expressed the view that influenza had a devitalizing influence on the central nervous system, lowering its resistance to the organisms or toxins producing these conditions. In his opinion disseminated sclerosis and paralysis agitans sometimes occurred as sequels of epidemic encephalitis.

Professor Edwin Bramwell suggested that influenza encephalitis and cerebro-spinal meningitis were possibly predisposed to by some common factor. Outbreaks of poliomyelitis were sometimes related to those of cerebro-spinal meningitis though their etiology differed. He had never met with a case of disseminated sclerosis arising as a complication of encephalitis. Dr. Claude B. Ker also thought that influenza, cerebro-spinal meningitis, and encephalitis were essentially different diseases, possibly with a common predisposing factor.

Clinical Cases.

Professor Lovell Gulland showed two cases. One was a case of Addison's disease with a previous tuberculous history; the patient was improving under tuberculin and large doses of adrenaline. The other case was that of a woman of 47, who had developed polycythaemia vera with the onset of the menopause; she was improving under *x*-ray applications to the long bones.

Dr. Cranston Low showed several cases of diseases of the skin, including one of lupous carcinoma, which after scraping was being treated with massive doses of radium.

JOINT MEETING IN MANCHESTER.

A joint meeting of the Manchester Medical Society and the Liverpool Medical Institution was held in the University of Manchester on November 1st, with Sir William Milligan in the chair.

The Ductless Glands and Skin Affections.

Dr. R. W. MacKenna (Liverpool) read a paper on "The relation of the ductless glands to some affections of the skin." He began by pointing out that the subject was one beset by difficulties, but he believed that the elucidation would come from clinical observation rather than from laboratory experiments. After dealing with the definite cutaneous changes associated with hypo- and hyper-thyroidism he showed how thyroid substance had been administered, more or less empirically, in psoriasis, ichthyosis, eczema, lupus, keloid, sclerodermia, and other diseases of the skin, sometimes with striking benefit, but sometimes with little apparent result. He then proceeded to review the action of the other ductless glands, mentioning particularly the influence of the parathyroids on calcium mobilization, the action of the suprarenals in influencing pigmentary changes in the skin, and their possible relationship to acanthosis nigricans and neuro-fibromatosis. Finally he discussed the internal secretion of the gonads, more particularly with reference to their effect on the growth of hair; hirsuties in women he definitely correlated with diminished ovarian secretion.

Angina Pectoris.

Dr. John Hay (Liverpool) offered some observations on a case of angina pectoris in which the electrocardiogram showed indications of a right bundle lesion, and in which the dominant site of the pain was epigastric. He discussed the significance of abnormal electrocardiograms in patients suffering from angina, and the view that an electrocardiogram showing marked deviation from the normal Q.R.S. complex was an indication of cardio-sclerosis. In the case described the electrocardiogram was of the type indicating some interference with the right branch of the bundle. Examination revealed no organic block, but there was some increased fibrosis and atheroma of the coronaries. Of 25 anginal patients who were electrocardiographed, 10 showed definite abnormality in the Q.R.S. complex. Of these, 8 died, as compared with 15 anginal patients with normal electrocardiograms, of whom 6 died during a similar period of time—that was a comparison of an 80 per cent. with a 40 per cent. mortality. From these and other figures the justifiable inference was that in angina pectoris an electrocardiogram showing branch bundle lesion or arborization block made the prognosis much graver. Reference was made to those cases in whom epigastric pain was the dominant symptom. Numbers were given showing the ratio of incidence to be 16 epigastric anginas in a total number of 288 patients. In the one patient before mentioned the pain was primarily epigastric in site, but examination revealed no lesion of the liver, gall bladder, or gastro-intestinal tract to account for the pain. Special attention was drawn to the importance of angina minor, the earlier manifestations of which are unobtrusive but significant, more particularly the substernal oppression or feeling of substernal distension which is induced by effort and which disappears with rest.

Indications for Cholecystenterostomy.

Mr. T. C. Litler Jones (Liverpool) discussed the indications for cholecystenterostomy. His usual practice, he said, was to anastomose the gall bladder to the duodenum, and in one case where a fistula was found between the gall bladder and the colon the fistula was re-formed with satisfactory results. This operation was of considerable value in relieving the symptoms in cases of malignant disease of the head of the pancreas. In cases where difficulty was experienced in removing stones from the common duct he had found the transduodenal route a good means of access. The duct ran for about half an inch in the wall of the bowel, and could be safely incised for this distance in removing stones. It might be difficult to find the papilla, but by using a probe or pressing on the duct above it could generally be identified. The pains so commonly seen after cholecystectomy might be due to the constant flow of bile into the duodenum, due to the relaxation of the sphincter of Oddi.

CARDIFF MEDICAL SOCIETY.

At a meeting of the Cardiff Medical Society held on November 8th Professor Ewen J. Maclean gave his presidential address on puerperal infection mortality in Wales. The address is printed this week at page 975.

Colloidal Silica.

Dr. W. H. Tytler, bacteriologist to the National Memorial Association, gave a demonstration in the absence of Professor S. L. Cummins. Recent work in the Tuberculosis Department of the School of Medicine and the Welsh National Memorial Association showed, he said, that silica colloid had a marked power of inhibiting the action of "complement," and thus prevent the lysis and destruction by bacteria of the blood fluids. The specimens illustrated how completely the lytic effect of fresh blood upon typhoid bacilli was stopped by the presence of colloidal silica. In one series of preparations serial dilutions of a typhoid broth culture had been mixed with an equal volume of sterilized normal salt solution, and from this mixture a measured volume had been added to an equal amount of fresh normal human blood, the preparations being then placed in the incubator at 37° C. for one hour and forty minutes. At the end of that time the whole contents of each tube were transferred to the surface of a trypsin agar slope and incubated over night. Very few colonies developed on the agar, showing that the bacilli had been killed by the lytic action of the blood.

In the next series similar serial dilutions of a typhoid broth culture had been mixed with an equal volume of silica colloid, and afterwards equal volumes of the mixture and fresh human blood were prepared and treated as in the former case. In this series the trypsin agar slopes were seen to be covered with a thick growth of typhoid bacilli, showing that in spite of the presence of the lytic substances of human blood the bacteria had been preserved from destruction during the period of one hour and forty minutes' contact at blood temperature. That this prevention of lysis was due to interference with "complement" was shown by the next series of tubes in which the complete inhibition of lysis of sensitized red blood corpuscles by the presence of silica colloid was demonstrated.

Dr. Tytler concluded that these observations might, perhaps, have a bearing on the action of silica in leading to the establishment of bacterial diseases in the tissues to which attention had recently been drawn by Gye and Kettle; while the inhibition of cytolytic activity noted might explain the fact, observed by Mavrogordato in South Africa, that macrophage cells containing ingested silica dust were protected from "autolysis" and digestion in the lymph spaces.

X-RAY DIAGNOSIS OF GASTRIC AND DUODENAL CONDITIONS.

The 700th ordinary meeting of the Brighton and Sussex Medico-Chirurgical Society was held on November 2nd, with the President, Mr. A. J. Hutchison, in the chair, when Dr. W. Barrington Prowse read a paper on "*X*-ray diagnosis of some abnormal conditions of the stomach and duodenum." In introducing the subject he made a point of its increasing usefulness, although there are many who are inclined to discount its value, and predicted that further experience, together with improvement in technique and apparatus, would increase its value still more. He gave a warning against too absolute a value being attached to the *x*-ray picture; the diagnosis was a personal matter, involving intimate knowledge of radiographic procedure and experience, combined with careful observation and interpretation of diverse signs. All radio-

graphic evidence should be considered together with, and in the light of, the clinical aspect of the case. Some reference was then made to the opaque meal, its composition and method of administration, and, following that, a description of the anatomy and radiographic appearances of the normal stomach. It was made clear that there is more than one type of stomach, and that the normal varies within moderately wide limits, and to a large extent in conformity with the general type of the individual. Then various points were dealt with which have to be considered in estimating the normal or abnormal condition of any stomach: these are its position, form, size, outline, tone, mobility, peristalsis, and motility, and they were described and considered in detail, and reference was made to circumstances which influence them. Dr. Prowse then turned to the particular consideration of some abnormal conditions. He referred first to gastroptosis, and deprecated its being looked upon as a pathological entity. It was an abnormal condition, not necessarily of itself giving rise to definite symptoms, but generally associated with, or secondary to, other conditions—especially organic lesions of an obstructive kind, though a number of cases appeared to be of mechanical, or possibly developmental, origin—or secondary to conditions of general health and chronic functional disturbance of the digestive organs. Gastric ulcer was then dealt with. He said that there were four classes: (1) superficial erosions, (2) penetrating ulcers, (3) perforating ulcers, (4) carcinomatous ulcers. The first were the most difficult to demonstrate, because they do not give rise to direct signs. The direct signs of ulcer were the barium-filled ulcer crater, and its accessory pocket, when perforating. The indirect signs included the various forms of spasm, from the incisura to hour-glass contraction, organic hour-glass, undue retention of food, alterations in peristalsis and tone (hypotonus), lessened mobility, and other minor signs. These were all considered in detail, together with their significance. The indirect signs were practically pathognomonic; the indirect required very careful interpretation and weighing in conjunction with the clinical evidence. Dr. Prowse then spoke of gastric cancer. *X*-ray diagnosis of this disease was of prime importance; the majority of gastric cancers gave radiological evidence of their presence, of their situation, and very largely of their extent. The most important sign of gastric cancer was alteration of contour, or filling defect; this must be fixed and permanent. Other signs were alterations in capacity of the stomach, diminished flexibility of stomach wall, patency or obstruction of the pylorus, changes of peristalsis, and alterations in motility of gastric contents. Finally, duodenal ulcer was dealt with. After a brief description of the anatomy and radiographic appearances of the duodenum, the irregularities which might be present in abnormal conditions were indicated. These affected outline, especially that of the first part of the duodenum, motility, and peristalsis. The signs of duodenal ulcer, like those of gastric ulcer, were (1) direct and (2) indirect. The only direct sign was deformity of outline; this was of various types, but the one essential characteristic of them all was persistence throughout examination. The indirect signs of duodenal ulcer were found in the stomach, and were concerned with changes in tone, peristalsis, and motility; gastric spasm might also be present. All these signs were described and considered in detail and their significance indicated. One combination of indirect signs was almost pathognomonic of duodenal ulcer—namely, hyperperistalsis associated with normal outline, though perhaps increased capacity of the stomach and undue retention of food. The paper was illustrated by lantern slides and reports of cases.

Dr. Donald Hall showed a lad, aged 19, suffering from general paralysis of the insane and locomotor ataxy. The patient was the fifth of nine children, seven of whom were alive, the last two having been born dead. His father had tabes dorsalis and had been blind for nine years. The only stigma of congenital syphilis in the patient was a sunken bridge to the nose. He had had difficulty in walking for several months, and more recently his mother said he had become "nasty-tempered" and untidy in his habits. Clinically he showed gross ataxy of all four limbs, inactive pupils, absence of Achilles jerks, the knee-jerks still being present although diminished, double extensor response, tremor of face and tongue, characteristic speech, and mental enfeeblement. That day he had had a severe gastric crisis. Dr. H. M. Galt reported that the Wassermann test was ++++ both in blood and in cerebro-spinal fluid; the gold test was positive, and cells in the cerebro-spinal fluid were 35 per cubic millimetre.

Reviews.

RESPIRATION.

Under the simple and inclusive title *Respiration*[1] Dr. J. S. Haldane of Oxford has published his Silliman Memorial Lectures at Yale University. Not only does the volume contain an excellent exposition of the subject of respiration by a worker who has long been regarded as one of the greatest living authorities in this field, but it is stamped throughout with the author's personality, and is one of the most peculiarly individual books that has ever been published on a purely physiological theme. It is in the main a development of a smaller book also published by the Yale University Press in 1917 under the title, *Organism and Environment as illustrated by the Physiology of Breathing*, in which Haldane dealt with the more general conclusions to which his life-long investigation of the problem had led him. The special merit of the volume now under review lies in the fact that it is no mere compilation and critical discussion of previous work, but is a fresh and original attack on a most interesting and, from a medical point of view, highly important problem.

The whole atmosphere of the book carries one back to a previous generation when authors did not fear to discuss their results and deductions in a broad philosophic way, not merely in relation to the organs and tissues examined, but to the organism as a whole and to its place in the scheme of Nature. To quote from the preface: "The time has come for a far more clear realization of what life implies. The bondage of biology to the physical sciences has lasted more than half a century. It is now time for biology to take her rightful place as an exact independent science: to speak her own language and not that of other sciences." But Dr. Haldane does not content himself with what many may regard as mere quixotic tilting at a frigid mechanistic conception of life, at the well-nigh ridiculous position taken up by many workers obsessed by the so-called facts of chemistry and physics; he has made a real and successful attempt to bring physiology and medicine into closer communion.

He opens with an historical introduction in which, in the space of fourteen pages, he gives a succinct and most readable account of the development of the subject from the time of Boyle and Mayow up to modern times. Room, however, might have been found for reference here to the interesting and ingenious work of Crawford, who claimed, with perhaps a certain amount of justification, that he had anticipated the discoveries of Lavoisier. This is followed by a couple of chapters on the regulation of breathing, where both the chemical and nervous control are fully dealt with. The discussion of the Hering-Breuer reflex in relation to "shortness of breath" in many nervous cases is very interesting. It may surprise some readers to learn that the respiratory centre so often referred to has not been anatomically determined and that the exact meaning to be attached to the term is still doubtful. Two chapters are devoted to the blood as a carrier of oxygen and of carbon dioxide. Although varying composition and concentration of the salts contained in the blood may account for varying dissociation curves of the oxyhaemoglobin in whole blood, the author maintains there can be no escape from the conclusion "that in different individuals of the same species as well as in different species the haemoglobin molecules are different."

In two more chapters Dr. Haldane discusses in detail the effects of oxygen want and the causes of anoxaemia. Both of these chapters are full of material of first-class clinical value. He believes that anoxaemia is frequently present in disease, but is seldom recognized. A detailed account of the methods of treatment of the condition of anoxaemia is also given. He writes here, "If there were only one clinical lesson derived from a perusal of this book I hope it would be that anoxaemia is a very serious condition." The important question of the relation of the reaction of the blood to respiration is discussed in Chapter VIII. The general conclusion reached is that the regulation of breathing in man during rest, under normal conditions, is regulation of the blood reaction. The actual changes involved are, of course, very small; so small indeed that, as the author says, "one might as well try to cut delicate histological sections with a blunt carving knife as try to demonstrate ordinary very minute changes in blood reaction

[1] *Respiration.* By J. S. Haldane, M.D., LL.D., F.R.S. New Haven: Yale University Press; London: H. Milford. 1922. (Med. 8vo, pp. xviii + 427; 104 figures. 28s. net.)

by the existing physical and chemical methods." Acidosis and alkali reserve are also discussed here in detail.

In Chapter IX the problem with which Haldane's name has so long been associated—namely, gas secretion in the lungs—is dealt with. There is a very clear statement of his own views and a fair criticism of those who do not accept his explanations. He adheres to his position in no unmistakable terms. "All the facts, therefore, and not merely our direct measurements, go towards showing that oxygen secretion is a most important physiological factor, not merely under exceptional circumstances, but during ordinary life at sea level." He has a very pretty jibe at the so-called purely objective methods at the end of this chapter. The next is devoted to the relation of blood circulation to breathing. It is maintained that the general circulation is correlated with the gas pressure in the capillaries, and hence it is neither the heart nor the bulbous nervous centres which govern the circulation rate, but the tissues as a whole. The regulation is as accurate and delicate as is the case in breathing. The conditions grouped together under the title "shock" are here discussed.

In Chapter XI the influence of the more commonly occurring impurities in air are examined—lighting gas, blackdamp, afterdamp, smoke, dust, etc. Many practical details in connexion with the industrial aspect of the problem are considered. Chapter XII deals with the effects of high atmospheric pressures and the practical applications of the observations made in special chambers for diving and caisson working; and Chapter XIII describes the effects of low atmospheric pressure, with special reference to mountain ascents and aeronautics.

Dr. Haldane sums up his general conclusions in a final chapter which is undoubtedly one of the most original and stimulating in the whole book. It clearly states his position, it gives his philosophy, and it reveals a man who has the courage to face his facts and to interpret them in the light of his own experience and reason. "The universe is a spiritual universe, and not a dualistic universe of matter and mind."

The book, alas! is *not* provided with an index.

INFECTIONS OF THE HAND.

The sum-total of disability and loss of wage-earning capacity resulting from whitlows and suppuration in the palmar spaces is so great, and the proper treatment is so often delayed, that a detailed study of *Infections of the Hand*,[2] such as that by Dr. Allen B. Kanavel, should find very many readers; indeed, the book has already reached its fourth edition. Unfortunately the pages are a little overloaded with case records, and notwithstanding the thorough basis of anatomical and experimental demonstration, with commendable repetition of important points and a multiplicity of illustrations, the book is not an easy one to read, though it well repays even impatient study. The fact of the matter is that the number of possible paths and routes of extension for pus in fingers, palm, and forearm is great, and although the author's injection experiments seem to show definite paths, yet in practice the permutations and combinations of extension obscure the track. Nothing but good can result from memorizing the diagrams scattered over the pages; nothing but good can follow the employment of the sites for incisions indicated; and certainly much function in hand and fingers will be saved by following out the precepts for after-treatment in the chapter on exercise.

The author has a good deal to say about the prevalence of hand infections; yet, in the factories in which he investigated the cases, only about 20 per cent. of hand injuries became infected. Apparently about 6 to 10 per cent. of all industrial disability is due to hand infections. It is no wonder that he insists on the importance of early treatment of even the slightest scratches or abrasions. As a matter of fact, he found that the serious accidents rarely resulted in sepsis, because they necessitated immediate recourse to the doctor. An interesting point is brought out in reference to the relation between the prevalence of such an infection as tonsillitis and that of hand infections, which seem to follow much the same curve.

It would be a service to industrial surgery if a very small abstract of the volume under review—say, just the summaries at the end of each chapter or section, together with the diagrammatic illustrations—were published as a pamphlet at a low price.

Dr. Kanavel's book itself deserves to be widely known to the medical profession.

[2] *Infections of the Hand.* By Allen B. Kanavel, M.D. Fourth edition. Philadelphia and New York: Lea and Febiger. (Med. 8vo, pp. xiii + 500; 185 figures. 5.50 dollars.)

A MANUAL OF ANATOMY.

A Manual of Practical Anatomy,[3] by Professor Walmsley of Belfast, is the latest addition to the number of books designed to serve the student as a guide in the dissecting room. Considering how old are the study of anatomy and the practice of dissection it is somewhat surprising that there should be room for so many textbooks dealing with these subjects. The explanation, we believe, is that a considerable difference of opinion exists, not as to the facts of anatomy or the advisability, not to say necessity, of dissecting, but as to how much assistance it is desirable to give a student, how best that assistance can be given, and, lastly, how much a student is able to learn and retain in the limited time at his disposal. Each teacher has his own views, although probably these would not be so divergent were the curriculum longer and the mental capacity of the student a more constant quantity. Professor Walmsley appears to us to have adopted on these questions a very fair and judicious attitude. He appreciates the danger of giving too much assistance, and impresses upon the student the wisdom of making his own dissections and observations, encouraging him to that end by the provision of most explicit instructions and by withholding from him those elaborate and artistic illustrations which so sorely tempt him to dispense with the labour of dissecting. The illustrations are in the main simple line drawings, which give the conscientious student all the assistance he requires. We consider Professor Walmsley has succeeded in his aim to a noteworthy degree, and we can assure any student who works steadily through these volumes that he will acquire a thorough and sufficient knowledge of the main facts of anatomy, and this in a way which is more likely than any other to ensure remembrance.

The subject scarcely lends itself to originality in the method of its presentation, but whenever an opportunity occurs of breaking away from tradition the author is not slow to take advantage of it, as, for example, in the illustrations of the dissection of the lesser sac of the peritoneum and in the schematic figures showing the anatomy of the perineum—always a difficult region for the student to understand. A further extension of such examples may be suggested in view of the likelihood of later editions, for there is a tendency among writers of such textbooks to present the anatomy of the various regions always from the same point of view and to appraise too lightly the simple schematic figure as a help to the student.

The text and illustrations of the *Manual* under review attain a high standard of accuracy and of interest, and we have no hesitation in warmly commending it to the student as a thoroughly sound and trustworthy work which provides him with all that he is ever likely to require either in the examination room or in the course of his future career as a medical practitioner.

CHLOROFORM ANAESTHESIA.

The aim of Dr. Goodman Levy in writing his book on *Chloroform Anaesthesia*[4] is to bring that method into close touch with the experimental sciences. He treats very fully of chloroform from the points of view of its physical properties, its pharmacology and toxicology, its physiology, the effects of deprivation of oxygen and the onset of asphyxia in its administration, the mechanism of its absorption and elimination, methods of administration, and delayed poisoning resulting from it.

The book thus goes deeper into fundamentals than is usual in a merely practical treatise, and will on this account be welcomed by all anaesthetists who are interested in the sciences which have made possible their technical skill in administration. That most of the alarming symptoms that may be met with in the course of the administration of

[3] *A Manual of Practical Anatomy.* In three parts. By T. Walmsley. Part I: The Upper and Lower Limbs. Part II: The Thorax and Abdomen. Part III: The Head and Neck. London: Longmans, Green, and Co. 1920-21-22. (Demy 8vo. Part I, pp. 176; 59 figures; 9s. net. Part II, pp. 233; 82 figures; 10s. 6d. net. Part III, pp. 272; 96 figures; 10s. 6d. net.)

[4] *Chloroform Anaesthesia.* By A. Goodman Levy, M.D., M.R.C.P. With a foreword by A. R. Cushny, M.D., LL.D., F.R.S. London: J. Bale, Sons and Danielsson, Ltd. 1922. (Demy 8vo, pp. viii + 159; 9 figures. 7s. 6d. net.)

chloroform occur in the early stages of anaesthesia is common knowledge, and therefore the author's statement that when chloroform is administered by a careful anaesthetist danger lies more in under- than in over-dosage will not cause surprise. The grounds on which the statement rests are fully gone into. Ventricular irritability is most marked under light, and least under deep, anaesthesia. There is little experimental evidence that cardiac inhibition has anything to do with cardiac syncope, and it is by no means clear that sudden death under chloroform is due to depressive action of the drug on the vasomotor centres. Some other explanation must be found, and the most probable is the onset of ventricular fibrillation. To produce the various forms of stimulation known to lead to ventricular extra-systoles under chloroform anaesthesia the narcosis must be light; they are difficult to evoke, and have never been known to progress to the usually fatal condition of ventricular fibrillation, when anaesthesia is deep. The human subject can recover from a first and even, though rarely, from a second attack of ventricular fibrillation, but the condition is extremely grave and can best be avoided by giving a sufficiently concentrated vapour from the very commencement of the chloroform induction. Administration must be regular as well as sufficient in vapour strength, and, if struggling occurs, the administration should be continued and the vapour strength increased, but the opposite course is commonly taught. We suspect that medical anaesthetists may perhaps have some lessons to learn from veterinarians; we understand that in horses a very stiff dose is safer and is habitually used, whereas in dogs and cats the strength of the vapour must be low.

Dr. Levy's book deserves recommendation, even though it does not settle the controversy as to the indications for chloroform and ether respectively. There are still certain cases in which chloroform is clearly indicated as the drug of choice; but if there must be a routine anaesthetic, then ether is to be preferred until some other anaesthetic that can be said to be ideal in every case has established its reputation.

HEALTH SERVICE IN INDUSTRY.

In his book on *Health Service in Industry*[5] Dr. W. Irving Clark, Junr., gives a very clear and succinct account of the best methods for investigating and improving the health of the workers in factories. He describes what may be regarded as almost an ideal system, which is necessarily somewhat expensive, but such a system is in actual operation in many large American factories. Dr. Clark suggests that in a factory of 3,000 workers there should be one full-time doctor, two part-time doctors, and three nurses. Part-time dentists and ophthalmic surgeons should also be available. He estimates that a service such as this, with the necessary equipment of dispensaries and medical supplies, would cost about 6 dollars a year per worker; he states that in actual practice a number of factories have been found to expend about 5 dollars, though in some establishments it reached 11 dollars.

And what is the return for this considerable outlay? So far as estimates can go it is more than equivalent to it. First, each applicant for work is submitted to a thorough medical examination, including tests for all the principal joints in the body, and he is graded in one of four classes, according to his health and strength. Thereby the firm is enabled to select suitable applicants for various kinds of work, and to reduce its labour turnover, which is always a very expensive item. Periodical examination of the employees, coupled with inquiries into cases of sickness and accident, and proper treatment of any injuries incurred during work, reduce the time lost from sickness and the expense of compensation. Maintenance of the best conditions of lighting, heating, ventilation, and sanitation in the factory not only directly promotes the health and efficiency of the workers, but it increases their goodwill and contentment, and constitutes a bond between employers and employees. These and other advantages secured by a complete medical service are undeniably of enormous value to the workers, and it is to be hoped that in course of time they will become available in all the large factories of this country; but alas, in how many do we find them at the present day?

An elaborate medical service is impossible in small factories, which, after all, constitute the majority of the industrial establishments in this country and in America. Dr. Clark points out that in them most of the service suggested can be carried out by means of a part-time doctor, backed up by a trained assistant from the ranks of the factory workers. In a factory of 1,000 workers a full-time nurse should be employed, for, in addition to the treatment of minor injuries and cases of sickness, she should be made responsible for maintaining accurate records. For this purpose a number of suitable forms and tables of directions are given by Dr. Clark. In fact, his book is full of practical details which could only have been collected as the result of long personal experience. On every ground, therefore, it is cordially recommended to everyone interested in the welfare of our industrial classes.

[5] *Health Service in Industry.* By W. I. Clark, Junr., M.D., F.A.C.S. New York: Macmillan Co. 1922. (Cr. 8vo, pp. 168; 10 figures. 9s. net.)

A GUIDE TO INSURANCE MEDICAL PRACTICE.

Insurance practitioners, by their want of acquaintance with the regulations which govern medical benefit under the Insurance Acts, sometimes throw a great deal of unnecessary work on the shoulders of those who assist in administering the Acts, and especially upon the members of their own Panel Committees and Medical Service Subcommittees.

The ordinary busy doctor may grudge the time and often has not the inclination to refer to the official regulations when in doubt as to his duties, nor does the legal terminology of these documents offer him any attraction to do so. Consequently he will welcome *Medical Insurance Practice*[6] as a handy reference book, giving a concise yet readable interpretation of the National Health Insurance Acts and regulations, with an authority which, though not claiming to be official, is based on information obtained at the Ministry of Health.

The scope of the work undertaken by Mr. R. W. Harris and Mr. L. S. Sack may best be indicated by a brief summary of its contents. The first chapter gives an introductory sketch of the general field of insurance practice and of the relationship of the medical man towards the insured person. The second chapter describes the responsible authorities and the relationship of the practitioner towards them; the third and fourth chapters deal respectively with insured persons for whose treatment the practitioner is primarily responsible, and those who are on other doctors' lists. Chapters V and VI explain the limitation of doctors' lists, and the position in regard to deputies, assistants, and partners. The four following chapters deal with the nature and scope of medical treatment and attendance; prescribing and the supply of drugs and appliances; certificates of incapacity, and records of illness. The relation between practitioners and the regional medical staff is discussed in Chapter XI. Four chapters are devoted to remuneration, and three to complaints, appeals, and disciplinary action. The last two chapters treat of withdrawal from insurance practice, the transfer of practices, and some miscellaneous matters. The appendices give extracts from official documents, and there is a comprehensive index.

Prefaces commending the work to insurance practitioners at large or to particular groups of practitioners are contributed by Dr. H. B. Brackenbury, Chairman of the Insurance Acts Committee; Dr. H. G. Dain, Chairman of the Conference of Local Medical and Panel Committees; Dr. H. J. Cardale, Chairman of the London Panel Committee; Dr. J. P. Williams-Freeman, Chairman of the Rural Practitioners' Subcommittee of the Insurance Acts Committee; and by Dr. J. R. Drever, Scottish Medical Secretary of the British Medical Association.

The authors are to be congratulated on the manner in which they have accomplished their object, and insurance practitioners will find this handbook very helpful. The chapters relating to the issue of certificates and charging fees to insured patients may be quoted as good examples of clear information on points that are constantly being misunderstood by panel doctors. The information on transfer of practices in Chapter XIX does not seem to be quite clearly enunciated: the concession that the Insurance Acts Committee has so strongly urged upon the Ministry of Health has now been granted and a great grievance removed. We should like to see added in any future edition a clear statement of the practitioner's duty to an insured patient whose name is removed from his list as from some previous date.

We recommend Panel Committees to consider in their own interests how they may best bring this excellent work before the notice of their constituents.

[6] *Medical Insurance Practice.* By R. W. Harris and L. S. Sack. London: Scientific Press, Ltd. 1922. (Cr. 8vo, pp. xiv + 327. 7s. 6d. net.)

THE ANNALS OF MEDICAL HISTORY.

The portrait of William Hunter on the cover of the summer number of the *Annals of Medical History*[7] illustrates Dr. Thomas McCrae's account of the two brothers, William and John, whom he compares, showing reason to regard William as not so much the inferior of his younger brother as is perhaps generally thought. This number is prefaced by the frontispiece of Jean Riolan's *Manual of Anatomy*, which also supplements an article with fine illustrations—that of Dr. F. R. Packard on Guy Patin and the medical profession in Paris in the seventeenth century. Guy Patin's fame must rest, so the editor is convinced, not so much on his professional writings as on his outspoken letters, which were published eleven years after his death and contain reflections on those in high places, including Richelieu and Mazarin. Dr. H. Viers gives an account of Cardinal Nicholaus Cusanus (1401–64), like Roger Bacon, a pre-Renaissance scientific seer much in advance of his time, and reproduces a translation, provided by the late Sir William Osler, of his *De Staticis Experimentis*. The life and work of Louis Daniel Beauperthuy, who, as was shown in these columns some years ago, may be considered to be the father of the doctrine of insect-borne disease, are sketched by Dr. Casey A. Wood, who spent the winter of 1920–21 in British Guiana within sight of Beauperthuy's grave, and has therefore been enabled to verify some published statements, and to correct others, relating to this pioneer in the now established part played by the mosquito in the spread of disease. In a short but attractively written article on the treatment of convulsions (tetany) with calcium in the seventeenth century, Dr. P. G. Shipley of Baltimore, who has done so much work on experimental rickets, relates how in the first year of the reign of William and Mary Dr. Walter Harris, their physician, treated empirically the disease afterwards known as tetany with calcium salts according to the best science of his day. Sir Richard Blackmore, a voluminous writer of verse and prose, some of which was intended to counteract the gross licentiousness of the drama and poetic literature, and to reprove the wits for their immorality and irreligion, is now probably remembered chiefly for the revenge taken on him by Pope, Codrington, Garth, and Steele. As a corrective to the general impression of Blackmore as a pompous and stupid pedant it is therefore well to have Dr. T. H. Toomey's justification of this physician, based on original records unknown to his earlier biographers. His medical writings are described as suffering from a lumbering style, and as having not only omitted the aphorisms of the Fathers of Medicine but insisted on the necessity of Aesculapians being endowed with eyes to see and souls to comprehend. In his attractively written narrative "What was Kappa Lambda?" Dr. Chauncey D. Leake touches on the psychology of secret medical societies, and gives an account of "the Kappa Lambda Society of Aesculapius," founded by the idealistic Dr. Samuel Brown at Lexington in 1819 to improve the ethics and mutual relations of medical men; established with these high ideals and with branches scattered over North America it is sad to find that it came to grief within twenty years, not without acrimony and scandal. There is a short note on Benjamin Franklin's invention of bifocal spectacles in 1785; as usual the editorials provide interesting reading.

NOTES ON BOOKS.

In *Difficulties: An Attempt to Help*[8] Mr. Seymour Hicks gives to young men advice expressed in the simple and friendly language that every father may use to his son. Too often, however, the British father, restrained by shyness and self-consciousness, fails to provide his son with the warnings that he knows are so sorely needed; indeed, to discuss intimate details with a boy "who has all the goodness of his mother's nature shining through his eyes is perhaps one of the most difficult tasks a father has to face"; it is for this reason that Mr. Seymour Hicks's series of seventeen talks, mainly addressed to boys about to leave school for their life's work, supply a definite want. The subject-matter covers the large field of the physiology of healthy life, religion, occupation, sport, gambling, personal finance, the choice of friends, reading and recreations, drink, marriage, sexual matters, and blackmail. Throughout the kindly and shrewd admonitions there runs the brightening thread of humour, which is happily described as a sixth sense—the greatest of our senses, and the motif of genial sympathy with the weakness of poor human nature. The care of the teeth with the use of dental silk and quarterly visits to the dentist is insisted on; smoking is permitted, but a number of wise cautions are appended, and on the whole it is held that were tobacco banished from the country it would be an advantage, though in that event "there would be fewer throat specialists and 'the lost chord' might never have been written." The chapter dealing with matters of sex, which was admittedly hard to write, is the most important of them all. Continence is first enjoined, with commonsense recommendations on the value of physical fatigue as a help; then the results of venereal disease are sketched, and the necessity for preventive measures is emphasized, though the details are not given, reference to Mr. H. M. Robson's book, *Sexual Disease and Protection*, and the publications of the Society for the Prevention of Venereal Disease being made for this purpose. The author has some very plain words on the vital importance of early skilled treatment being sought should infection be contracted. The medical details upon which Mr. Hicks ventures are correctly given, and we can commend the book as full of common sense and wise advice, all the more likely to be effective because expressed in an unconventional way.

Paraguay, among the South American States, is that probably of which the average Englishman knows least, which is saying a good deal. It was therefore with some expectation of instruction as well as amusement that we opened *The Golden River*,[9] by Major J. W. Hills, M.P., and Ianthe Dunbar. We ought perhaps to have been warned by the name of the historian of fly fishing for trout that it would be a book mainly about fishing. The fish the party of four—two men and two women—went out to catch was the dorado, a big fish (several over 40 lb. were taken), a very sporting fish, fighting as gamely as the salmon, displaying similar tactics, and having a pink flesh very good to eat. It is not a salmon (it belongs to the Characinidae); it does not go to the sea, and it is doubtful whether it migrates at all. Where it spawns is not known, but it has fifteen hundred miles of waterway from north to south and as much from east to west to choose from. Later on, when some of the party visited the Chaco, we hear a little of the birds of that great plain. None of the party seem to have been ill, though mosquitos were numerous, and sandflies in clouds found them as much of a treat as Paget, M.P. Mosquito veils by day and nets by night were essential, and one of the writers—a lady—praises citronella, by which is probably meant citronella oil, which has a considerable reputation for driving off mosquitos; it is sometimes mixed with carbolic acid. It is, we believe, desirable to get the oil made under the direction of the Ceylon Government. The book is well illustrated, mostly by photographs, but there are some pleasant pencil sketches in the text.

Professor S. Lyle Cummins has written in verse eight little plays for children.[10] Each of the three volumes amongst which the plays are distributed is prefaced by excellent hints on how to produce children's plays; and the little books are made additionally attractive with illustrations by G. L. Stampa. The author evidently recognizes the innate strain of cruelty in children, and nearly all the subjects he has selected are of the blood-thirsty or blood-curdling variety. The blood-curdling effect is increased by some of the professor's descriptions, as in the remark of Bluebeard about the heads of his former wives in the chamber of horrors:

> "And just to ensure that they always look nice—
> I know 'tis expensive—I keep 'em . . . *on ice*."

We are not sure that Professor Cummins is wise in his "Forewords," and in sundry passages in the plays, in making cryptic allusions to current political topics. A modern juvenile Bluebeard may understand the couplet:

> "In destroying poor Bluebeard you drive the last nail
> In the coffin of 'power in the hands of the male.'"

Or the line:

> "And the masculine dies at the hand of the *male*."

But, as the mouse says to the Sleeping Beauty, "I don't think!"

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[7] *Annals of Medical History*, 1922, iv, No. 2. Edited by F. R. Packard, M.D. New York: Paul B. Hoeber. (Yearly subscription, 8 dollars; single numbers, 2½ dollars.)

[8] *Difficulties: An Attempt to Help*. By Seymour Hicks. London: Duckworth and Co. 1922. (Pp. 318; one plate. 10s. 6d.)

[9] *The Golden River*. By J. W. Hills, M.P., and Ianthe Dunbar. London: P. Allan and Co. 1922. (Demy 8vo, pp. 187; illustrated. 10s. 6d. net.)

[10] *Plays for Children*. By S. Lyle Cummins. Illustrated by G. L. Stampa. Vol. i: *Bluebeard; Haroun el Rashid*. Vol. ii: *St. George and the Dragon; The Sleeping Beauty*. Vol. iii: *Goldilocks and the Three Bears; Torquil Mac Ferron; Thomas Olifant; Tyranny*. London: Methuen and Co. 1922. (Demy 16mo; illustrated. 1s. 6d. per volume.)

CAUSES AND PREVENTION OF BLINDNESS.

FINAL REPORT OF THE COMMITTEE.

In September, 1920, Dr. Addison, then Minister of Health, set up a Committee "to investigate and report on the causes of blindness, including defective vision sufficient to impair economic efficiency, and to suggest measures which might be taken to prevent blindness." A Committee of fourteen was appointed, including the Right Hon. G. H. Roberts, M.P. (chairman), Dr. J. C. Bridge (Factory Department, Home Office), Dr. A. Eichholz (Board of Education), Mr. E. D. Macgregor (Ministry of Health), Mr. J. S. Nicholson (Ministry of Labour), Mr. G. F. Mowatt (National Institute for the Blind), Mrs. Wilton Phipps (London County Council), Mr. W. M. Stone (Scottish Board of Health), Dr. James Taylor, the neurologist, Mr. Bishop Harman, Dr. J. B. Lawford and Sir John Parsons, ophthalmic surgeons, and Mr. Stephen Walsh, a Labour M.P. Mr. C. J. Bond was added to the Committee in April, 1921. For the first year of the Committee's working the medical secretary was Dr. R. A. Farrar, who died in Russia recently "during the performance of duties finely and humanely inspired"; for the second year that office was undertaken by Dr. James Pearse of the Ministry of Health.

The Committee held forty-six meetings and numerous meetings of two subcommittees. Sixty-six witnesses were examined and special inquiries were made. An interim report was issued in 1921 relating to the light used in kinema studios; this was noticed at the time in our columns. The final report of the Committee is now issued,[1] a concisely written octavo pamphlet of 136 pages.

The Number of the Blind.

The Register of the Blind for England and Wales, compiled by the Ministry of Health, shows that in 1921 there were 34,894 persons "too blind to perform work for which eyesight is essential." Males are slightly in excess of females; 8 per cent. are under the age of 16 years, 37 per cent. between 16 and 50 years, 34 per cent. from 50 to 70 years, and 20 per cent. over 70. The latest return of the age at which persons become blind shows that 21 per cent. become blind within the first year of life, and thereafter about 10 per cent. for each decade up to 70 years.

The Causes of Blindness.

In this section figures are given from several returns of blind infants, children, and adults. The chief returns are those published by Mr. Bishop Harman, which cover figures under each of these heads, including the large volume of figures which he has collected from the blind schools of the London County Council; other returns have been collected by special inquiries made for the Committee by the Board of Education, and by Mr. P. G. Doyne of London, Mr. H. R. Bickerton of Liverpool, and Dr. A. Fells of Bristol. From these several sources there is obtained a fair appreciation of the relative incidence of the several causes of blindness, and thereon the report considers them seriatim. The order given is as follows: ophthalmia neonatorum, syphilis, congenital malformations, surface inflammations in childhood, trachoma, myopia, glaucoma, industrial disease and accident, eye accidents in civil life, blindness due to the war, sympathetic ophthalmia.

Ophthalmia Neonatorum.

The incidence of blindness due to this disease varies according to the age at which the inquiry is made. In infants the incidence is as high as 49.2 per cent., in school children between 20 and 28 per cent., and in adults it falls as low as 3 per cent. It is evident that this disease is a very serious factor in the causation of blindness, and constitutes a problem of vital national importance, the more especially as an individual blinded is affected from birth and throughout the years of highest economic efficiency. The incidence of the disease appears from statistics to vary considerably in different districts. It is low in counties—less than 10 per 1,000 births; it is high in county boroughs, in which the rates vary exceedingly. The variations are so marked that they appear to indicate differences in conditions notified rather than actual differences in the prevalence of the disease. Accordingly there is some hesitance in making deductions from the figures; but so far as this is allowable it appears that there is no diminution in the incidence of the disease notified, but rather material increase, since the year 1918. It is, however, considered that notification does serve its main purpose—that of enabling cases to be brought under early and efficient treatment; for, whilst there is a higher rate of notification, there is definite evidence that blindness due to the disease is lessening. The report states:

"We have, however, clear indication, from figures submitted to us by Mr. Bishop Harman with regard to school children in London, that the proportionate incidence of blindness due to this disease has markedly decreased. These figures show that between 1907 and 1913 inclusive there were admitted to schools for the blind 737 children, of whom 134 were blind from ophthalmia neonatorum, or 18.03 per cent. The number admitted between 1914 and 1920 was 755, with 89 blind from the disease, or 11.91 per cent., a very material diminution. Again, if the figure for the first period of 134 children blind from the disease be related to the average of the elementary school roll in London over the years 1907–13, this shows blindness from this cause in 18.3 per 100,000 children, and if the figure 89 of the second series be related to the average roll over the years 1914–20 the incidence is 12.5 per 100,000."

Despite this definite evidence of a diminution in the cases of blindness from ophthalmia neonatorum, the Committee is not satisfied with conditions as they exist. It emphasizes the necessity for the prevention of the disease by combating gonorrhoea, which is mainly responsible for the severe inflammations which may result in blindness. This is a matter engaging the attention of the Ministry of Health in dealing with the prevention and treatment of venereal disease in general. The next line of defence is the treatment of the expectant mother. The report says:

"It is gratifying to note that we owe to an Englishman, Benjamin Gibson of Manchester, who wrote in the year 1807, the first clearly reasoned description of the rational means for preventing ophthalmia neonatorum. It is difficult to believe that his words, which are quoted below, could be bettered even at the present day. They were as follows: 'First to remove, if possible, the disease in the mothers during pregnancy; second, if that cannot be accomplished, to remove artificially as much of the discharge as possible from the vagina at the time of delivery; and third, to pay at all events particular attention to the eyes of the child by washing them immediately after delivery with a liquid calculated to remove the offending matter or to prevent its noxious action.'"

The more general adoption of clinical investigation during pregnancy should lead to early discovery of cases of vaginal discharge, research into its bacteriology, and prompt measures for securing treatment by a private practitioner, at a general hospital, at a special session of an ante-natal clinic, or at a venereal disease clinic.

Prophylaxis at birth is now very generally adopted. The detailed care of the eyes of the newborn has been the subject of special attention by the Central Midwives Board. If the rules of the Board were carried out universally there is little doubt that ophthalmia neonatorum occurring in the practice of midwives would be materially reduced. It does not appear to the Committee that the average practising midwife is, as a rule, either suitably trained or equipped for this purpose. Six months' training is insufficient, especially when it is found that the standard of general education of candidates is so low that "many pupil midwives who present themselves for examination have not had sufficient education to enable them to express themselves on paper and have to be examined *viva voce*." Further, there is no security that a midwife will ever have seen a case of ophthalmia neonatorum before being placed on the register. The Committee recommends:

"That arrangements should be made for pupil midwives to visit ophthalmic hospitals or the ophthalmic departments of general hospitals for the purpose of gaining direct experience of ophthalmia neonatorum."

Considering the use of prophylactic drugs, the Committee is fully satisfied as to the efficacy of Credé's method in skilled hands, but cannot recommend it for routine adoption by midwives. There is risk that they may think this is all that is necessary and neglect the scrupulous cleansing, which is even more important, or mistake as "only a little reactionary discharge" what is really a manifestation of the disease itself. The report adds:

"We consider, however, that Credé's method should be used under medical supervision in all cases where vaginal discharge is known to exist. Where such prophylactic method is adopted, we consider nitrate of silver to be the most effective agent, but that it should not be used in stronger solution than 1 per cent."

The Committee considers it of paramount importance that the disease should be diagnosed and notified at the earliest possible moment in order that nursing facilities may be available or provision made for admission to hospital. It thinks that if medical practitioners had facilities provided for

[1] London: H.M. Stationery Office, or through any bookseller. 1922. (Pp. 136. 4s. net.)

consultation with an ophthalmic surgeon at the home of the patient, and for prompt bacteriological investigation, there would be less delay in the proper treatment of the disease, and it recommends accordingly. Under the Notification of Births Act, 1915, visits of health visitors have been of material assistance; no less than 93.5 per cent. of the cases of ophthalmia neonatorum occurring in 1919 were so visited. Arrangements for home nursing have been made in most metropolitan and county boroughs—that is, the areas in which the disease most frequently occurs. But the Committee is not satisfied that the arrangements are always sufficient.

"Ophthalmia neonatorum is emphatically a disease which requires skill and experience in nursing, and, if the case is to be successfully treated at home, skilled nursing should be available at the earliest possible date." The midwife is inadequate for the purpose. "Irrigation by a trained nurse must be carried out at frequent intervals, both by day and by night, if the sight is to be saved."

The Committee recommends that the Ministry of Health should take steps to ensure that adequate nursing provision is always available for cases of ophthalmia neonatorum which are not admitted to hospital.

The Committee found evidence that some medical practitioners failed to recognize early and notify promptly cases of the disease. It considers that the inadequate knowledge of the diseases of the eye possessed by the large majority of medical practitioners on admission to the *Register* is in a large measure due to the very limited amount of training in this subject which they receive as medical students, and the common absence of any examination in the subject for qualification. It therefore recommends that "the General Medical Council again be urged to insist that every student presenting himself for a qualifying examination in medicine shall be examined in ophthalmology."

Speaking generally, it is found that in London and large cities and in many county boroughs provision is made for hospital accommodation both for babies and their mothers, but in some towns and in many rural areas there is no such provision. Examining special arrangements made for these cases, it is considered preferable that hospital accommodation should be provided by securing beds in a few of the well-known teaching hospitals in centres convenient to the great masses of the population, rather than in special hospitals provided for the purpose as has been tried in London. There would be the advantage in the use of general hospitals in that students attending the practice of these hospitals would become familiar with the care and treatment of these cases, which they would not so readily do if provision were made at one special hospital alone. Also it is found that a special hospital soon becomes stigmatized and mothers are unwilling to enter. The report adds that—

'in a few places cases of ophthalmia neonatorum are treated in hospitals for infectious diseases. In our opinion it is not desirable to expose mothers during the puerperium or their infants to even a remote risk of infection."

Syphilis.

Syphilis, both congenital and in the acquired form, is responsible for a large amount of blindness. It causes interstitial keratitis, iridocyclitis, choroiditis, and optic atrophy. In children the incidence of blindness from this cause may reach as high as 31.4 per cent. The figure is less when with added years other factors producing blindness come into play; but—

"considering the information available to us we think it would be correct to estimate that syphilis is the direct cause of not less than from 10 to 15 per cent. of the blindness at present existing in this country. This is an alarming figure, and it is to be remembered that many other cases of blindness are due to degenerative changes consequent on vascular disease possibly syphilitic in origin, which cannot be accounted for in the statistics. . . . Syphilitic blindness is but part of the wide problem of the menace of syphilitic disease in general. Its diminution will depend upon the success of the various measures—moral, social, medical—directed against the evil. It is to these measures and to the recognition by the affected person of the necessity of early treatment and its continuance over several years that we look for the prevention of blindness from this cause. Patients too readily relinquish treatment after the first abatement of symptoms, and consequently develop later manifestations, including affections of the eye, which would have been prevented by persistent treatment."

Congenital Malformation of the Eye.

Cataract, dislocation of the lens, absence of iris, and albinism account for a considerable amount of blindness in school children, varying from 20 to 30 per cent. Certain defects occur in families, but the majority appear sporadically. Knowledge is not at present available to enable the indication of preventive measures for these conditions, except that where an inherited tendency is manifest marriage and parenthood are undesirable.

Surface Inflammations in Childhood.

The exanthemata, measles particularly, take a toll of infant eyesight. These cases account for from 3 to 5 per cent. of blindness in school children. Phlyctenular keratitis and chronic blepharitis also do much damage, the keratitis alone being responsible for another 3 per cent. of blindness in school children. Poor districts are particularly liable to these diseases. Dr. P. J. Hay of Sheffield showed that in the good districts only 6 per 10,000 of the children were affected by blepharitis, whereas in the bad districts the rate was as high as 26 per 10,000. The actual blinded eyes form only a small proportion of the injury done by the inflammations. For the prevention of these diseases attention must be directed primarily to improvements in diet, housing, sanitation and ventilation, and in personal cleanliness; for treatment the provision of special institutional accommodation, such as that recently arranged in London between the school authorities and the Metropolitan Asylums Board, is essential; the provision is at present inadequate. Some difficulty arises in the treatment of these chronic cases where parents are of the more ignorant sort. They will not allow their children to remain under treatment for a sufficient time to effect a cure. The powers of the "Children's Act" are insufficient to effect the purpose, and the Committee recommends:

"That the Board of Education should consider the question of seeking additional powers to enable a local educational authority to require a parent to submit a child suspected to be suffering from chronic external eye disease to medical inspection and adequate medical treatment where the authority deem such inspection and treatment necessary."

Trachoma.

This disease, once so terrible in this country, and still disastrous in causing blindness in other countries, is now rare here. Out of 1,855 school children only 4, or 0.21 per cent., owed their condition to the disease; and out of 601 blind of all ages 8, or 1.3 per cent. The main necessity is to secure that the disease shall not be reintroduced into this country by unguarded alien immigration. The Committee inquired into the arrangements for the examination of immigrants, and considered that the Aliens Acts, which formerly provided many loopholes by which aliens suffering from the disease might enter the country, are now so administered as on the whole to deal adequately with the risk. It recommends, however,

"That in sanctioning appointments as medical inspectors under the Aliens Acts, the Ministry of Health should endeavour, as far as possible, to secure that such officers, if they have not already had special experience of contagious eye diseases, and particularly of trachoma, should be afforded the opportunity of acquiring it."

Reference is made to the singularly effective measures taken in France during the war, under the superintendence of Sir William Lister, to stamp out trachoma amongst the labour corps imported from Egypt and China. The earliest recruits were badly affected, later companies were selected at the port of embarkation, so that the incidence was much lower. Measures taken to separate the affected men had the most beneficial results. The whole incident forms a striking illustration of the value of preventive medicine. The application to civil life is obvious.

Myopia.

Actual blindness due to degeneration of the eyes from the effects of myopia accounts for some 3 to 6 per cent. of blindness in school children, and up to 14 per cent. amongst blind persons of all ages. It is also responsible for a serious amount of impairment of vision short of actual blindness. In a series of 3,300 blind and partly blind children collected by Harman in London, besides 54 quite blind there were 1,191 cases of myopia of a degree sufficient to necessitate education in special myope classes. The majority of the children had myopia of over 10 diopters. It is obvious that even when provided with suitable glasses these children see with difficulty. Further, there is evidence that these eyes are frail, and there is ever-present risk of damage to or degeneration of the retina, and this risk is increased by strain. The Committee reports very favourably on the work of the

myope classes first instituted in London in 1908, and since adopted in many towns in this country and abroad; and it recommends:

"That further provision should be made by education authorities for the education in myope classes or by similar methods of children with serious defect of vision requiring such facilities, and that steps should be taken to discover these cases at such an early age as will allow of preventive measures being adopted."

Reference is given to Harman's recent evidence of the risk of breakdown and inefficiency in work, of myopes engaged in habitual close eye work. Taking cases of myopia above 3 D. of ages from 20 to 60 years the myopes who habitually did close work had 53 per cent. of failures, as against 9.4 per cent. amongst myopes who did no continuous close work. It is therefore considered that every encouragement and assistance should be given to children's after-care committees and juvenile employment committees in the selection of suitable occupations for these short-sighted children. A classification of suitable occupations is given based on London experience.

Glaucoma.

The incidence of blindness due to this disease varies from 9.15 per cent. for a group of blind of all ages to 29 per cent. in a home for the aged blind. The determining cause of primary glaucoma is unknown and therefore unpreventable. Blindness can be obviated by early and adequate treatment. It is essential to emphasize that in the early stages glaucoma may appear to be relieved by the frequent change of glasses; and in this connexion the Committee draws attention to the grave risk which arises from the treatment of these cases by opticians who are not qualified to detect the real condition. The difficulty of and the necessity for prompt recognition of acute and chronic glaucoma also give added weight to the recommendation for more thorough training of the medical student in ophthalmology. The general practitioner sees such cases first. The acute form may be mistaken for iritis, with disastrous results if it be treated as such; the headache and vomiting may suggest a bilious attack, to the overlooking of the eye condition. The chronic form is so insidious in its onset that it may easily be overlooked. Hence the necessity for trained and alert practitioners.

(To be continued.)

THE HISTORY OF TUBERCULOSIS.

SCHORSTEIN LECTURE.

THE Schorstein Memorial Lecture was delivered by Dr. PERCY KIDD at the London Hospital Medical College on November 8th. The title was "Forty years in the history of tuberculosis," but the lecturer traced the earlier history also.

Early History.

Dr. Kidd said that forty years ago, when the tubercle bacillus was discovered, there was a distinct parting of the ways in the history of tuberculosis. The malady had attracted attention as far back as the time of Hippocrates, who held that phthisis was an ulceration of the lungs. Hippocrates made no mention of consumption as being contagious, but Aristotle expressly said that it was, and Galen regarded consumptives as dangerous persons to live with. No real advance in the knowledge of phthisis took place until the seventeenth century, when Sylvius recognized the existence of lymph nodes or tubercles in the lung, which he regarded as enlarged glands, the enlargement being the result of an accumulation of viscid humours or secretions. Richard Morton, later in the century, embraced Sylvius's views with regard to the glandular origin of tuberculosis, but insisted upon the frequency with which healing took place. Thomas Willis, a contemporary, was the first to controvert the prevailing belief that phthisis invariably depended upon an ulceration of the lungs; he had made autopsies on persons who had died from the disease, and found the lungs free from ulceration. Desault, a Frenchman, compared tubercle in the lungs with the condition of scrofula, and attributed contagion to the presence of worms—a remarkable foreshadowing of the parasitic theory of disease. William Stark, who died in 1770, furnished an excellent anatomical description of a tuberculous lung. Towards the end of the eighteenth century Nathaniel Baillie, physician to St. George's Hospital, gave a complete description of the pulmonary lesions in consumption, such as could hardly be bettered to-day. It was interesting to trace the persistence of the Hippocratic notion, despite the knowledge that phthisis might occur without any ulceration of the lung. The existence of tubercles in organs other than the lungs did not escape Baillie's observation, but he failed to see any connexion.

The Nineteenth Century.

The nineteenth century marked much greater progress. Among the first of the great workers was Bayle, who traced the coexistence of tubercles in various organs to a common cause, and who gave the name of tuberculosis to the disease. But a greater than Bayle was at hand to throw light in the darkness. In 1819 Laënnec published his memorable work, *Traité de l'auscultation médiate et des maladies des poumons et du coeur*, which revolutionized the theory of consumption and the clinical treatment of tuberculosis. He declared that all phthisis was tuberculous in character, and that tubercles might arise in any organ, and were connected by a special disposition or diathesis. Laënnec's chief claim to immortality rested upon his mediate auscultation, but his pathological study of consumption alone would entitle him to be regarded as one of the great pioneers of medicine. His views did not find universal assent, and in Germany Virchow insisted that the caseous change was not characteristic of tubercle, and that a similar change occurred in new growths unrelated to tubercle. The promulgation of these views let loose a flood of controversy, especially in Germany, and foremost among Virchow's supporters was Niemeyer, who applied his master's doctrine in a most uncompromising manner. In 1865 Villemin announced his discovery that tuberculosis was a specific affection, its cause residing in an inoculable agent, and that it belonged to the class of virulent maladies. It was not surprising that Villemin's conclusions should have been contested. Attempts were made to show that tuberculosis could be induced in animals by inoculation of non-tuberculous material, but further experiments under stricter conditions only served to demonstrate the truth of Villemin's hypothesis. William Budd came to the conclusion that tuberculosis was a zymotic and infectious disease like scarlet fever; but it was long before the doctrine of infection found general acceptance.

Discovery of the Bacillus.

It came, therefore, more or less as a revolution in the medical world when, in 1882, Robert Koch announced his discovery of the tubercle bacillus—a discovery which completely revolutionized the views of the profession both as to diagnosis and treatment. Before long the identity of human and bovine tuberculosis came to be generally accepted. Professor Bulloch had stated that between 1882 and 1900 very few seriously doubted that human and bovine tuberculosis were identical, though dissentient voices were raised here and there. In 1901 Koch declared that they were not identical. As a result of extensive experiments on young cattle inoculated in various ways he convinced himself that human tuberculosis could not be communicated to cattle, whereas in animals infected with bovine tubercle bacilli general tuberculosis of the bovine type usually resulted. Obviously the question of the infection of man with bovine tuberculosis could not be satisfactorily settled, but Koch considered such infection improbable. These statements stimulated much experimental work, and Koch's conclusions were challenged. Some investigators thought that the morphological and cultural distinctions characterizing the two types were well marked, others that the differences were unimportant. It seemed now to be established that Koch was right in stating that human and bovine tuberculosis were not the same disease; that there were pathogenic differences could not be doubted. In the course of his researches Koch discovered that tuberculous animals were very sensitive to extracts of the cultures of the tubercle bacillus, the result being a febrile illness combined with inflammatory and necrotic changes in the tuberculous foci. He was led to apply tuberculin to diagnosis and treatment, and the result of his experiments on cattle showed the tuberculin test to be trustworthy for diagnosis. In the case of the human being the question could not be settled so simply. In some instances of severe progressive tuberculosis no reaction occurred, and a negative reaction was found in some tuberculous persons suffering from typhoid fever or other specific diseases and in pregnant women. Objections had been raised to the specific diagnostic value of tuberculin, and clinicians had come to discount its value. Von Pirquet's cutaneous test and Calmette's ophthalmic test avoided the severe results of tuberculin, though in the case of the latter the conjunctivitis sometimes set up was the reason for its non-acceptance.

Diagnosis.

When *x*-ray examination came to be applied to the diagnosis of pulmonary diseases, in practically every case radiating shadows were seen passing from the root of the lung upwards, and frequently patchy shadows in the neighbourhood of the root. Some radiologists looked upon these fan-shaped markings as indicating tuberculous lesions. Dr. Jordan had stated that in every case tuberculous invasion started from the root; in other words, that tuberculosis of the apex was not primary but secondary to invasion from the root along the

lymphatics. *X*-ray examination was a very valuable help in the diagnosis of pulmonary diseases, but it could not reveal the earliest stage in the formation of tubercle, and it was doubtful whether it could differentiate between active and quiescent lesions. While acknowledging the assistance of the *x* rays, the lecturer felt that in diagnosis and prognosis reliance must still be placed upon the well-tried methods of physical examination combined with a consideration of the patient's history and symptoms. It appeared to him that at the present day less attention than formerly was being paid to the niceties of physical examination; the younger generation hied off to the laboratories for special examinations before the information possibly to be yielded by ordinary methods had been exhausted.

Treatment.

In reviewing the advances made in the treatment of pulmonary tuberculosis during the last forty years three methods stood out: (1) tuberculin; (2) sanatorium treatment; (3) induction of pneumothorax. It was not surprising that the method of injecting tuberculin, ushered in under such credentials, excited the liveliest interest and hope. In the early days the treatment was surrounded by an atmosphere of mystery. The exact nature of the remedy was not revealed. Doctors in all countries were naturally anxious to make a test, but at first only a limited supply of the agent was available for foreign use. Local results were strikingly manifested in lupus, but when, in accordance with Koch's instructions, the dose of tuberculin was gradually increased, constitutional symptoms of a severe nature were frequently excited, with fatal results in some cases. After a time some workers began to use tuberculin on a different principle, giving increasing doses spread over a considerable length of time so as to avoid constitutional reactions. The results of tuberculin treatment in pulmonary tuberculosis had, generally speaking, been disappointing; better results had attended its use in tuberculosis of the bones and joints. Sanatorium treatment, like treatment with tuberculin, raised extravagant hopes which made disappointment inevitable. Some modifications of the original sanatorium routine had been found necessary. The excessive feeding first insisted on had been abandoned. If permanent benefits were to be secured by sanatorium treatment after-care was necessary, especially in the case of the poorer patients. The difficulty of applying such treatment to early cases was obvious. The diagnosis of the disease in its earliest stage was, generally speaking, at present beyond the powers of medical men. Very few people who had slight symptoms thought it necessary to submit themselves to examination. Consequently patients labelled early by their medical advisers were not really early cases at all. The lecturer's conviction was that this method had given better results than any other so far. Among well-to-do patients there had been cases in which a successful result had persisted for some years. In less successful cases life had been prolonged for a period. One of the great merits of sanatorium life was its educative value for the patient and, through him, for his family. The complexion of the average case of consumption seemed to the lecturer to have altered during the last forty years; in his experience rapidly progressive cases were less frequent, both in private practice and at the chest hospital. For the third of the modern treatments—induction of pneumothorax—the selection of suitable cases was not an easy matter. It was limited originally to cases in which the disease was confined or nearly confined to one side. The tendency during the last few years had been towards a less rigid limitation of the cases submitted to operation. In many apparently hopeless cases great improvement had been gained, and some patients had been able to return to their work. There were obstacles in the way of the adoption of the method in many cases, but as a palliative measure it had its place. He summarized the highly favourable conclusions as to pneumothorax operations given in the recent report of the Medical Research Council (British Medical Journal, September 30th, 1922, p. 606). On the other hand, in cases of low resisting power and progressive disease, little benefit could be expected.

In conclusion, Dr. Kidd said that great progress had been made during the last forty years in etiology and diagnosis, and, seeing that tuberculosis mortality had fallen considerably, it might be inferred that there had been a corresponding improvement in treatment; but the mortality had begun to fall before the general recognition of the infective nature of tuberculosis, and he attributed the lessened mortality largely to the improved standard of living and more widespread knowledge of hygiene. Segregation of advanced cases was desirable, but it involved the provision of special hospital accommodation on a large scale. It seemed unlikely that the tubercle bacillus could be eradicated. Must they then despair, and say with Falstaff: "I can get no remedy against this consumption"? If it were true that a large proportion of the population had become partially immune, it might be hoped that future research would discover means of increasing such immunity. The key to the prevention of tuberculosis was the discovery of the biochemical conditions which favoured immunity. If tuberculosis could never be completely exterminated, it would be possible, nevertheless, in the future to bring it under better control.

VIENNA.

Some Recent Medical Work.

Dr. E. W. Scripture, physician to the Speech Clinic, West End Hospital for Nervous Diseases, London, in a recent address on "Some medical novelties in Vienna," delivered before the Medical Section of the British Psychological Society, touched upon several matters which are now attracting interest in that famous medical centre. In the course of his remarks Dr. Scripture mentioned the magnificently equipped neurological institute now under the charge of Professor Marburg; he described this as a factory for producing research, and observed that one of its workers, Dr. Pollak, has just published an extensive monograph on a piece of British intellectual property that has been annexed by Vienna—namely, "die Wilson'sche Krankheit," the disease named after Dr. S. A. Kinnier Wilson, who first described it. Dr. Scripture next gave a short account of the treatment of general paralysis by malaria inoculation, first proposed in 1887 at the Vienna Psychiatric Clinic by Professor Wagner-Jauregg, and now reinforced by injections of salvarsan. He then referred to the large phonetic laboratory, directed by Dr. Stern at the Throat Clinic of Professor Hajek, where cases of aphonia and defective mutation are treated by methods of suggestion and re-education. A specialty of this laboratory is the treatment of post-operative cases of carcinoma of the larynx. After removal of the larynx the patient is taught to swallow air into the stomach and then use it to produce sounds. A kind of tone is produced by some constriction in the lower pharynx. This method is very favourably reported on by Dr. Stern. The Vienna Physiological Institute also maintains a laboratory of experimental phonetics, and there is a flourishing society of experimental phonetics predominantly medical in its membership.

Steinach's Operation.

Dr. Scripture then discussed in somewhat greater detail the experimental work carried on by Professor Steinach in one of the departments of the Institute for Biological Research. He said:

As far back as 1912 Professor Steinach published the results of experiments on guinea-pigs and rats in regard to the determination of the sexual instinct and the secondary sexual characters as the results of the internal secretions of the sexual organs. He showed that the transplantation of an ovary in a castrated male causes that male to develop bodily and mentally like a female. Later he showed that when the ovary becomes firmly fixed the feminization goes abnormally far. The male does not stop at taking on the small size of the female with corresponding distribution of hair, development of the breasts, and mentality; the breasts even begin to secrete—without any pregnancy—and the feminized male actually suckles the young that are presented to it. When a testicle is implanted in a castrated female, the genital organs change toward the male type, the bones and muscles become larger, the hair becomes coarse, the general appearance is robust and masculine, manly courage appears, and the animal drives away normal females but attempts sexual activity with a female in rut.

The opportunity arose for an experiment on human beings.

A soldier, 30 years old, had tuberculosis of the testicles—that is, he was practically castrated. His appearance was feminine, his breasts were well developed, the hips were wide, and the hair on the body had the feminine distribution. For many years he had been an actual strong homosexual, taking the passive part. The removal of the tuberculous testicles was indicated. In the same hospital was a man with a painful undescended testicle. The two patients were placed in neighbouring beds. The diseased organs were removed from the soldier and the healthy testicle was taken from the other man and placed in the groin of the soldier. The soldier afterwards took on a manly appearance, became heterosexual in his mental attitude, and subsequently married.

It is impossible even to sketch Professor Steinach's further experiments; only some of the firmly established conclusions

can be summarized. In the first place, the secondary sexual characteristics and mental attitude of the male depend on the internal secretion of the testicles furnished by the interstitial cells, not the sperm cells. These cells are termed the "gland of puberty." Steinach has shown that ligature of the vas deferens, whereby the outflow of sperm is hindered, causes a degeneration of the sperm cells and an increased growth of the interstitial cells. There is consequently an increased amount of the hormone from the interstitial cells passing into the blood. Most remarkable of all is the effect of this hormone on the bodily and mental constitution.

I will now describe a series of photographs shown me by Professor Steinach from a recent investigation.

The first was an anatomical preparation showing the undeveloped sex organs of a normal young rat. The second was a similar one of a fully developed rat. The third was that of a rat whose testicles had been removed in early life and transplanted in the abdominal wall. This rat had grown to full size and was potent. An examination of the implanted testes showed that they contained only interstitial cells and no sperm cells. The fourth was that of a rat of the same age as the last in whom the testicles had simply been removed in early life and not transplanted; this rat had rapidly become old. The fifth was that of a normal old rat with atrophied sexual organs. The sixth was that of an old rat in whom the ductus deferens had been tied in old age; this rat had at once become energetic and sexually potent. The seventh was that of a rat killed at the age of 1 year; at birth he had been removed and kept absolutely alone; his sexual organs had not developed to the normal size but had remained infantile. The eighth was that of a rat of the same litter likewise kept isolated for a year but thereafter placed with females. He became strong and potent. After he was killed his sexual organs were found to be of normal size, but the testicles contained almost entirely interstitial cells and very few sperm cells.

Professor Steinach has a theory that there are two kinds of interstitial cells, the small and the large. Each produces a hormone that controls the sexual instincts. One set gives the driving force to the heterosexual impulse, the other to the homosexual impulse. According as one kind or the other predominates, the animal becomes heterosexual or homosexual. This theory would come as a shock if we had not already been prepared for it by psycho-analysis. We now know that all human beings possess both these impulses at and after birth; whether the child later becomes predominantly heterosexual or predominantly homosexual depends, according to the analysts, on the way in which he is brought up. The average boy becomes predominantly heterosexual because he is first attached to his mother and is later able to transfer his attachment to other females. He may become homosexual because the homosexual attachment may be made predominating by over-attachment to father or brother, or because an intolerable over-attachment to mother may be so violently suppressed that it drags with it all the heterosexuality, leaving the homosexual element alone active. A similar result may occur where heterosexual attachment is difficult or impossible. According to Steinach, however, the final predominance is determined simply by the relative degrees of development of the two kinds of cells.

These two views need not be conflicting. Professor Steinach says—and I am certain he does not mean to joke—that psycho-analysis (as well as all psychic treatment) has an effect because it alters the internal secretions and thereby influences the bodily and mental character. This means that the mental influences of childhood go along with changes in the endocrine glands.

There is a type of patient that is the despair of the general practitioner and the physician in the out-patient department.

As an example I will take the case of a stone-polisher, 47 years old, who complains of tiredness and inability to do any work. He falls asleep during the forenoon while sitting on a chair. His memory has become very bad. During the last two years he has lost 50 lb. in weight. He is quite unable to earn his living. He looks emaciated, aged, and depressed. The hair on his temple is grey. Hands and ears are cyanotic and cold. Bodily investigation shows nothing abnormal. The Wassermann reaction is negative. The general practitioner would probably make a diagnosis of early arterio-sclerosis, and would continue to give potassium iodide and certificates of "unfit for work" until the end of his life.

A psycho-analyst would recognize this as a very common type of mental disturbance that might be curable by proper analysis. Such a diagnosis, however, does not help the patient in the least. He is a poor man, and psycho-analysis is only for those who can pay good fees. Apparently the case is hopeless.

I have purposely chosen this case from the advance sheets of a book that will shortly appear by Dr. Schmidt of Berlin giving his results with the Steinach operation.

On February 7th this patient underwent the operation of vaso-ligature on the right side. On March 10th he states: "To-day I can count the tiles on the roof opposite, which five weeks ago appeared to me only as a confused mass. I am as well now as I ever was. My mind is clear. The tiredness has gone. I can work as well as formerly." On April 15th he was seen again. He looked fresh and rosy and much younger than 47. He was working daily from 4 in the morning till 6 in the evening. On October 10th he was seen once again. He looked like a man in the thirties. His hair had become dark brown and much thicker. He had undertaken a very large piece of work and carried it out with an intensity and joy such as he had never before had in his life.

Dr. Schmidt reports a whole series of such cases, with similar results. There are also other cases in which no benefit is obtained. In going over his histories I am struck with the fact that he does not seem to have made a previous psychological study of them. The proportion of successes would have been still greater if certain types had been excluded.

With the Steinach operation the ligation of the vas deferens hinders the outflow of sperma. This at once produces pressure on the interstitial cells and accelerates their internal secretion into the blood. This causes the sudden rejuvenation of the first few days. Thereafter there is a pause. The sperm cells degenerate and are replaced by increased numbers of interstitial cells. This is followed by an abnormal amount of internal secretion. This, as was first shown in the case of rat No. 8 above, produces a real rejuvenation of the tissues. The patient actually becomes a younger man.

Steinach has given no explanation of the effect on the mind in such cases. I may suggest that the internal conflicts due to repressed unconscious complexes have been kept down as long as the person was young and vigorous. With exhaustion or shock or approaching age the diminished vitality lessens the control of the conscious mind and the complexes have a chance of breaking forth and more or less disabling the person. The rejuvenation, I suggest, brings back the energy needed for the repression.

The problem lies before us of introducing the Steinach operation into general and hospital practice for suitable cases. It is not expensive. If the cases are suitably selected it is highly successful. It does not interfere with the procreative power because it is done on only one side. A successful result restores the man to work, whereby he becomes a useful member of the community instead of a living corpse. It usually restores his potency.

The relation of the Steinach operation and other forms of hormone therapy to psycho-analysis is a very close one. Even if we do not believe that psycho-analysis acts only by changing the action of the endocrine glands, and that the changes in character result from the glandular changes, and not directly from the analytical treatment, yet we can think of the possibility—at least in some cases—of using hormone therapy instead of psycho-analysis. The possibility of curing a portion of the countless cases of anxiety neurosis (including hysteria) by a simple inexpensive surgical operation is worth considering. The problem is also important to the analytical specialist. With quite a large number of patients undergoing psycho-analysis the point is reached where the resistance proves too great to be overcome. The treatment must then be broken off as hopeless. The patient thereafter usually falls into a condition of secondary repression which is worse than the original one. Such a result is more common in advanced life. It is in just such cases that perhaps a Steinach operation would effect a cure.

Dr. Scripture next recounted a case bearing upon the interpretation of patients' dreams, with the object of bringing out his contention that the main psychological complex may be quite other than the sexual complexes usually sought for by psycho-analysts. He concluded his address with a brief tribute to the efforts of the Vienna Medical School to rise above the misfortunes of the present time.

To those of us who know and love Austria (he said) there is something deeply touching and profoundly inspiring in finding that in Vienna the devotion to scientific research still remains a vital force amid poverty and disaster at a time when most of the rest of Europe is mainly concerned in using the situation for commercial profit. The nation that can still maintain the University of Vienna deserves a better fate than to become the exploited slave of international financiers.

THE next French Congress of Medicine will be held at Bordeaux in 1923 under the presidency of Professor Arnozan, when the following subjects will be discussed: remote sequelae of malaria, relations between the sympathetic and endocrine glands, and treatment of meningococcal infections.

OWING to a scarcity of rabbits the Breslau Pasteur Institute has decided that everyone applying for antirabic treatment must supply at least two rabbits, the price of which will be refunded by the Institute.

British Medical Journal.

SATURDAY, NOVEMBER 18TH, 1922.

ANIMAL AND PLANT PATHOLOGY.

We turn from the study of human disease to consider the morbid processes affecting animals and plants in the hope that here may be found an answer to some of the problems which laborious research on human infections has hitherto failed to solve. Diseases in plants and animals can be investigated by the experimental method, the origin, course, and treatment of disease being examined with a thoroughness rarely possible in human patients. Comparative pathology is studied also for reasons of public health. The animals with which we are often in contact are themselves liable to invasion by bacterial enemies, many of which are capable of infecting man, and the diseases by which plants are beset, though not directly transmissible to man, are of great economic importance. In moments of reflection also our thoughts may turn from the more pressing claims of human disease to notice how in every manifestation of life health is constantly in jeopardy. Fevers and distempers disturb the existence of birds; mammals and reptiles, fishes, insects, and worms are liable to invasion by unwelcome parasites; trees suffer from tumours, cereals from blight; and even tobacco does not escape from the ultramicroscopic filter-passing virus. Throughout the animate world perfect health is a very rare gift.

But, it may be asked, can we hope to derive any practical benefit to human medicine by a study of the diseases of animals and plants? The knowledge of the rudiments of botany and zoology which the medical curriculum prescribes ensures a broad-minded outlook on the natural world; this having been assured, at least in theory, what expectation have we that an excursion into the realms of plant and animal pathology will yield information of value in the study of human disease?

The problem is not a new one for the British Medical Association. The possibility of getting light from vegetable pathology was brought to notice over forty years ago by Sir James Paget in an address to the Section of Pathology at the Annual Meeting at Cambridge in 1880. Sir Clifford Allbutt, in his Address in Medicine to the Annual Meeting in Glasgow in 1888, covered a rather wider field, and in his presidential address in 1920 to the Annual Meeting of the Association in Cambridge he recurred to the subject. In the Section of Pathology (Human and Comparative) at Glasgow this year a discussion on animal and vegetable pathology in relation to human disease was opened by Professor Frederick Hobday, F.R.C.V.S. During that discussion, a report of which is published in our issue this week, Professor W. H. Lang warned students of comparative pathology against the snare of false analogies, but Sir Clifford Allbutt, who followed, desired to delete the word "false," maintaining that argument by analogies had been the bane of medicine from the earliest times. The path of advance, he said, was to go beneath analogies and similitudes to underlying affinities, which, indeed, were often far from apparent.

It must be admitted that only with the greatest caution can comparisons be made between diseases of plants and the diseases of animals, since the structure of the tissues is so fundamentally different, the characters of the infecting agents so diverse, and the mechanism of resistance based on such opposite systems. Animals provided with a general circulation of body fluids can bring to bear on an infective agent protective substances derived from all parts of the organism in the attempt to save the health of an injured member; plants, on the other hand, can only resist locally, and often the wisest plan is to isolate the infected area and sacrifice the diseased tissue. Yet in spite of these apparent dissimilarities, in all manifestations of life the nature of this reaction is fundamentally the same—namely, an attempt to preserve the integrity of the cell against an injurious agent. The protection of the cell is the basis of immunity in plants, in animals, and in man, yet we know almost nothing of the means by which it is secured or the defects which lead to its default. Researches in resistance to human disease have been concerned chiefly with acquired immunity, and we are now fairly well informed of the reactions which take place in an infected area and of the protective substances which make their appearance in the body fluids. But of natural immunity and the security enjoyed by individual cells we know no more than is expressed by the word "susceptibility." The difficulties which beset the study of natural immunity in man are great, but it is probable that light will be thrown on the problem by the study of the phenomenon as it presents itself in plants and the lowlier forms of animal life; the prospect of enlightenment in this way warrants the closest interest in comparative pathology.

Professor Hobday's review of the diseases communicable from animals to man proves how important comparative pathology is from the point of view of public health, and indicates the extensive benefits the community has derived from advances already made. Thanks to the efficiency of the veterinary service, glanders and rabies are practically stamped out in this country, whereas only twenty years ago glanders in horses was common, and many human beings were exposed to this terrible infection. If, however, there is reason for congratulation on what has already been accomplished in certain fields, there is reason for shame also at the paralysis which has overtaken administrative measures designed to combat the most widespread of all communicable diseases—namely, tuberculosis. There are at present a million tuberculous cattle in Great Britain, and it is reckoned that over 10,000 children die annually from drinking tuberculous milk, yet the Cattle Tuberculosis Order, which was temporarily suspended during the war, has not been re-established. Professor Hobday states on behalf of the veterinary profession that, given a free hand, they could stamp out tuberculosis in cattle in the same way as they have already stamped out glanders and rabies; and he calls on the medical profession to assist in bringing pressure to bear upon the authorities for the reinstitution of the Cattle Tuberculosis Order.

Disease processes in plants are worthy of study not because of possible transmission to man, but because they may yield a clue to some of the mysteries which enshroud malignant disease in man. Professor Lang described that remarkable disease crown gall, but although he warns us against drawing inferences from morbid processes developing in such fundamentally different tissues as those of plants and animals, yet the resemblances are very striking and provide material for thought. The tumour-like growths of crown gall follow the inoculation of the tissues of the plant with *Bacterium tumefaciens*, and consist of irregular masses of cells stimulated to riotous overgrowth by the presence of the infective agent. The first response of the plant to this infection is merely an exaggeration of the normal process of wound irritation, but the same comment is equally

applicable to human neoplasms, since in these also irritation is often an important factor in the early stages. Later the cells of the crown gall tumour invade the normal tissues and set up secondary tumours at a distance, a sequence of events reminding us at every point of the familiar features of malignant disease. If we knew as much of the initiation and spread of cancer as we do of the tumours of crown gall a notable advance would have been achieved.

The nature of the so-called filter-passing virus is a fascinating problem. Here the investigator is dealing with a form of life too small to be seen with the highest magnifications of the microscope, and yet capable of initiating grave disturbances in both animals and plants. The first demonstration that disease can be caused by a filtrable virus was made in the plant disease known as tobacco mosaic, and many other plant diseases have since been shown to be due to ultramicroscopic organisms; the number of human diseases attributable to this form of infection is yearly increasing. The plant pathologists have taught us much concerning these infections. They have proved that these virus diseases are commonly transmitted by the bites of insects; they have established that these diseases can be hereditary both in host-plant and in insect; they bring forward evidence against the probability of any saprophytic life for these organisms, and have indicated how very dependent this form of life is on suitable environmental conditions.

Hitherto the diseases of man, animals, and plants have been studied by three separate specialized groups of workers—the human, the veterinary, and the plant pathologists; each has proceeded along separate lines of inquiry, and there has often been lamentable ignorance of the progress made in the kindred sciences. Yet many diseases are common to man and animals, and in the study of them—we may instance anthrax—it is obviously desirable that veterinary and medical pathologists should combine. In fact, the number of diseases of plants or animals which either directly or indirectly affect the health of man makes a long list; of the essential details of the disease processes in animals and plants the medical pathologist should be accurately informed. But the subject will be of interest not only to pathologists, and not only on account of the questions of public health which we have seen to be so intimately involved. Echoing the words of Sir Clifford Allbutt, we will venture to assert that the significance of disease will never be rightly understood if attention is confined to those morbid processes affecting man which it is our duty as a profession to attempt to relieve. Ill health is often attributed to constitutional defects and perverse habits; in a limited sense this may be true, but we are all familiar with diseases which attack the strong and spare the weak. May we not recall the rebuke: "Those eighteen, upon whom the tower in Siloam fell, and slew them, think ye that they were sinners above all men that dwelt in Jerusalem?" Bacteria were not created for the express purpose of inconveniencing or punishing man; they came into existence to perform an indispensable function in nature, and life on this planet is only possible thanks to their ceaseless activities. Throughout the animal and vegetable kingdoms we find the incessant conflict of two forces, one endeavouring to preserve health, the other attempting to undermine it. In many plants the dispute is settled by the establishment of symbiosis, in which both forces combine to work for the common good. It is possible that even in man this happy compromise is sometimes achieved. By reflecting on this conflict as it manifests itself throughout the natural world we shall escape from too narrow an outlook on the question of health and disease.

THE TREATMENT OF DIABETES BY INSULIN.

Recent scientific work in the laboratories of the University of Toronto, the nature of which was described in some detail on November 4th (p. 833) by Dr. J. J. R. Macleod, Professor of Physiology in that University, has yielded results which, it is perhaps not too sanguine to hope, have opened a new chapter in the history of the treatment of diabetes. As our readers have learnt from Professor Macleod, the effects observed in animals have justified the trial of insulin in man, and diabetic patients have eagerly flocked to take advantage of the new treatment. It consists in the administration of a substance, to which the term "insulin" has been applied, present in an extract made by a new method from the pancreas of the ox, pig, or sheep. The authorities of the University have taken special measures, appropriate to an exceptional situation, to protect and control the manufacture and use of this substance in Canada and the United States, and they have offered as a free gift to the Medical Research Council all rights in a patent covering the product and the process of its preparation, for which application has been filed in this country on behalf of the University of Toronto. The University has done this with the object of putting into the Council's hands the means of exercising the same powers of control over the preparation of this important new substance for trial in this country as the University has found it desirable in the public interest to exercise in the American continent. Representatives of the Council have recently visited, by the courtesy of the University, the various centres of work in Canada and the United States, and have examined closely the progress already made there, with a view to finding the conditions under which the production of insulin for a careful trial of its properties may best be accelerated in this country. In view of the great importance and growing interest of this subject, both to the public and to the medical profession, the Medical Research Council, which has accepted the generous offer of the University of Toronto, has now made a public statement of the present situation and of the considerations by which the policy of the Council is being guided.

At the outset it is explained that the new substance insulin is not yet available in this country in any form. It is being made on a moderate scale at Toronto, and on a small experimental scale in one or two laboratories in the United States, and these sources of supply are hardly sufficient for the daily needs of the diabetic patients selected for experimental treatment at those places. Under control and guidance from Toronto, manufacture by one American firm is being developed upon a large scale, but no supply at all is yet available for the medical profession in general. The preparation and administration of insulin are alike still in the experimental stage.

There can be little doubt, as we observed a fortnight ago, that the new treatment opens a bright prospect of relief, of longer life and less severe deprivation, to many of the sufferers from a disease so distressing and hitherto intractable as diabetes. The improvement of the methods of the preparation and administration of insulin, and the determination of the limits of its efficacy—whether in any cases and by any method of application it can effect a permanent cure, or only, as hitherto, relieve at each administration an incurable defect—these are matters urgently demanding further research.

The active pancreatic principle (insulin) is of unknown chemical nature, and is easily destroyed in the course of its extraction. The possibilities of the new treatment

have sprung from the discovery of a method whereby this active substance can be extracted and freed from concomitants which, when ordinary methods are used, lead to its rapid destruction. A process which succeeds on an experimental scale in the laboratory presents new and much more serious difficulties on a large scale in the factory. Even under the best conditions yet available it appears that great variations in activity may occur between individual batches of the extract, made without any known variation of the process. While the use of an inactive preparation would bring painful disappointment to the patient and bring the treatment into undeserved discredit, the use of a preparation of unexpectedly high potency may be definitely dangerous. No indication of the activity, and so of the remedial value, can be obtained except by experiments on the potency of each sample, previous to its actual use for a patient in the hospital ward, and these require a well-equipped physiological and biochemical laboratory. The degree of permanence and condition of stability of the extract are as yet practically unknown. In face of these conditions, to leave the production of the remedial extract to unassisted and uncontrolled commercial enterprise would be to imperil the credit and success of the treatment, and entail for many sufferers not only disappointment but serious danger. Apart from any of the obvious possibilities of improper exploitation, it is clear that even preparations made with a conscientious effort to adhere to the methods and precautions so far indicated by the discoverers might prove to be at once useless and harmful.

In these circumstances the Medical Research Council has considered it a duty to use any means placed at its disposal for safeguarding, while accelerating, the proper production of this remedy. The Council is already arranging for the preparation of insulin for trial and study at several hospital centres where the necessary facilities exist. The scientific workers who accept this responsibility will undertake to work as members of a co-ordinated team in close touch with the National Institute for Medical Research at Hampstead, with a view to achieving the most rapid progress possible towards improved methods of preparing and of using the extract. At the same time, and independently of this immediate research work, the Council is considering under what conditions it may be possible to grant licences to private institutions or factories having proper facilities for making and testing the extract. It may be that some of the existing commercial organizations may find it possible to deal satisfactorily with the problem of providing insulin and of keeping pace with the demand. This demand will grow rapidly and continuously if the methods of treatment and precautions against danger become so simplified by research work that the remedy can pass into general, as distinguished from hospital or specialist, practice. It may prove, on the other hand, that the needs of the situation can best be met by a special organization, established with the primary aim of relieving the many sufferers from diabetes, and with no view to making profits on an ordinary commercial basis. If this should prove to be the most effective method for providing the remedy, money for its establishment would be needed. The Medical Research Council has no funds at present which it could apply to such a purpose.

The intention of the Council is to promote, in the light of recent experience in Canada and of such new knowledge as research will gain, whatever enterprise or organization is best fitted for securing the earliest production of the insulin extract under proper conditions of safety and control, and so to facilitate, with the least possible delay, a thorough and scientific trial of the new treatment in this country.

THE AUSTRALASIAN MEDICAL CONGRESS, 1923.

On November 4th we published, at page 890, a short note from our Victorian correspondent on the sectional arrangements for the Australasian Medical Congress to be held in Melbourne in November, 1923. At the last meeting of the Central Council (as recorded in the Supplement of November 11th, p. 175) a communication was read from the President of the Congress (Mr. G. A. Syme, M.S., F.R.C.S.) calling attention to this event and to the fact that it would be the first session of the Congress to be held under the control of the Australian Branches of the British Medical Association and of the Branches in New Zealand. Mr. Syme's letter conveyed a request that the President of the Association, or some distinguished officer, should attend the Congress. This invitation was most cordially received and the Finance Committee was instructed to consider ways and means. The President, Sir William Macewen, said that he had all the will to go, but would like a little time to think over the project before making a decision; we know we express the view of every member, both here and overseas, in hoping that he may find it possible to accept. We have now received from Dr. A. L. Kenny, the General Secretary, an advance proof of the preliminary programme for the Congress. He tells us that the aim of the local executive is to make this meeting in Melbourne a memorable occasion in order to ensure a long sequence of successful congresses under the same control. "We hope," he adds, "to be in the position to give a very cordial welcome to members of the parent Association, and to this end we invite your powerful aid." The Congress will be held in the buildings of the University of Melbourne from November 12th to 17th. The Patrons are the Governors-General of the Commonwealth of Australia and the Dominion of New Zealand, the Governors of New South Wales, Victoria, Queensland, and Western Australia, and the Chancellor of the University of Melbourne. The Vice-Presidents are distinguished representatives of the science and practice of medicine in the Commonwealth, the Dominion, and in Tasmania. The treasurer is Dr. C. H. Mollison, and Dr. Kenny is assisted in his secretarial duties by Dr. F. L. Davies and Dr. W. S. Newton. Besides these honorary officers in Melbourne there are local secretaries in Sydney, Brisbane, Adelaide, Perth, Auckland, Dunedin, and Hobart. The scientific work of the meeting has been organized in the following sections: Medicine, Surgery, Obstetrics and Gynaecology, Pathology and Bacteriology, Preventive Medicine and Tropical Hygiene, Ophthalmology, Otology Rhinology and Laryngology, Neurology and Psychiatry, Diseases of Children, Naval and Military Medicine and Surgery, Dermatology, Radiology and Medical Electricity. Officers have been appointed for each section, and the general arrangements for the Congress are in the hands of a number of committees; the plan thus follows very closely that of the Annual Meetings of the parent Association. We note with interest that much prominence is given to a resolution of the Executive Committee as follows: "In all the work of the Congress particular attention shall be given to the preventive aspect, including medical research." Another matter of a different kind, though well worthy of note, is that the Railway Commissioners of the Commonwealth and of the Australian States have agreed to make generous reductions in the price of railway tickets for those attending the Congress. In this respect the Australian railway authorities have shown good sense and public spirit. It is to be hoped that the British Railway Clearing House, which declined to grant reduced fares for the Annual Meeting at Glasgow, will follow the example from overseas before the Association meets in Portsmouth next summer. All communications regarding the Australasian Medical Congress should be addressed to Dr. A. L. Kenny, Medical Society Hall, Brunswick Street South, East Melbourne, Victoria. We wish him and his colleagues every success, both in the quality of the work done and in the number of those who attend.

INTRATHORACIC SURGERY.

When Sir William Macewen first showed that the thorax could be opened without collapse of the lungs the importance of his observations and operations does not seem to have been sufficiently appreciated by surgeons; at any rate, his methods were not adopted in general surgery. This failure to appreciate a new observation is not uncommon, and is difficult to explain. The fact remains that Macewen's work remained almost unrecognized until the progress made in intrathoracic surgery during the war won acknowledgement for it. Of how great that progress has been Mr. T. P. Dunhill, assistant director of the surgical unit at St. Bartholomew's Hospital, has given some striking instances in a paper published recently in the *British Journal of Surgery*.[1] "Fear of the unknown within the thorax has," he says, "hitherto made us pause in dealing with tumours in this part of the body. . . . A greater familiarity is tending to remove our fear." The article describes three intrathoracic tumours removed through an incision which split the upper half of the sternum, a method of approach which Professor Gask had practised even before the war. In the first case a fibroma growing from the spinal column occupied the dome of the right thoracic cavity. Intratracheal anaesthesia was employed, in order, as Mr. Dunhill states, to prevent collapse of the lung when the thorax was opened. The tumour seems to have been fairly easily freed from its surroundings save for an attachment to the periosteum covering the body of a vertebra. This attachment was divided without difficulty or troublesome haemorrhage. The result was complete recovery after an uneventful convalescence. The second case was one of an elongated colloid adenoma of the thyroid, the upper end of which was visible in the neck, while the lower portion extended down behind the sternum to the level of the seventh dorsal vertebra. The tumour was attached by dense adhesions to the aortic arch and other neighbouring structures. The sternum was divided longitudinally and then transversely at the level of the third costal cartilage, so that the anterior thoracic wall could be opened by double doors as it were. The tumour was separated and removed intact. It is interesting to note that in this case intratracheal anaesthesia was not used, but the operation was performed under open ether without apparent disadvantage. Evidently collapse of the lung (to avert which intratracheal anaesthesia had been chosen for the first case) did not occur in this patient. The after-result suggests that the tumour, although removable, was malignant, and it is feared that recurrence of the growth has begun in its original site. The third case was one of retrosternal cystic adenoma of the thyroid. Local anaesthesia was employed and the tumour removed after splitting the sternum. Adhesions to the aorta had to be separated; the manipulations must necessarily have been very gentle, and do not appear to have offered grave difficulty or danger in either this or the former case. The patient made a good recovery and remains greatly relieved. The record of these operations shows how far we have advanced with intrathoracic surgery. It might of course be argued that cases requiring such operations are so rare in civil practice that these surgical procedures can only be embarked upon with any prospect of success by surgeons who became familiarized with intrathoracic methods by vast and rapidly gained experience in battle surgery. The history of abdominal surgery does not bear out this view. Once the way has been proved practicable the careful surgeon of the future should not find it difficult to follow. Intrathoracic surgery has been established, and we feel confident that we are on the eve of a new era. One point in particular requires emphasizing: these operations can be safely performed under any form of anaesthesia. Macewen had proved that elaborate pressure chambers were unnecessary for the performance of thoracotomy. Gask and Dunhill have confirmed this and shown in addition that neither local nor intratracheal anaesthesia is essential. It is not every patient who is suitable for operation under local anaesthesia, nor, if we may say so, is every surgeon fitted temperamentally for operating with his patient conscious and anaesthetized only in the area of the operation. One further remark may be ventured. During the pioneer stages of intrathoracic surgery the public will, perhaps, consider that such operations are more safely performed by the surgeons who have made them their particular study. Yet by the terms of appointments to the surgical unit at St. Bartholomew's private patients cannot, so we understand, have direct access to the knowledge and experience of Mr. Dunhill or Professor Gask if they should stand in need of such operations as form the subject of this paper.

[1] Vol. x, No. 37, 1922.

SMALL-POX AND VACCINATION.

In the pamphlet on small-pox and vaccination the Research Defence Society has very opportunely issued it is pointed out that there are in England and Wales at the present time about fifteen million persons unprotected against small-pox, and that among them are multitudes of unvaccinated children. Reference is made to the epidemic in Gloucester in 1895–96, when 279 unvaccinated children under 10 years of age died of small-pox, while only one child died out of more than 8,000 who were vaccinated before or during the epidemic. Another instance of how small-pox picks out the unvaccinated children was the outbreak which occurred in 1903 at Ossett, in Yorkshire, where, in a school of 169 children living under similar conditions, of the 14 revaccinated pupils none took small-pox, of 78 vaccinated pupils 5 took small-pox, and of 77 unvaccinated pupils 37 took small-pox. A very usual argument of antivaccinationists is that small-pox has been abated, not by vaccination, but by sanitation. It is controverted by many historical facts. For example, the immediate results of Jenner's discovery of vaccination in 1796 were not due to sanitation. The great abatement of small-pox was already achieved by 1812, while the rise of modern sanitary science came later, with the work of Edmund Parkes, Sir Edwin Chadwick, and Sir John Simon; the Public Health Act did not become law until 1875. The pertinent question is put—Why, if sanitation alone were sufficient to prevent epidemic diseases, have not measles, diphtheria, scarlet fever, and whooping-cough been reduced to the same extent as small-pox? No one contends that vaccination is our one and only defence against the spread of small-pox—the disease is fought also by sanitary measures, but sanitation alone is insufficient. Pamphlets for the instruction of the lay public as to the risks of small-pox and the value of vaccination have been published from time to time—by the British Medical Association, for example, and recently by the Ministry of Health.[1] These have proved useful for their purpose. The present outbreak has furnished opportunity for similar effort, and in addition to the Research Defence Society's pamphlet Dr. McConnel Wanklyn has published in attractive form an address[2] to the Society of Medical Officers in March last. The pamphlet differs from other tracts in presenting to the public a pronouncement made by a medical man to medical men, so that there can be no suspicion of special pleading or polemics; at the same time, it is an address which any layman can understand. Also, he has issued through the same publisher a leaflet at the modest price of 2d., addressed to the public. The most directly successful advocate of vaccination, however, is small-pox itself, as is at present being witnessed in London. Up to November 14th cases treated by the Metropolitan Asylums Board since October 25th had increased to fifty, of which fifteen had proved fatal. Forty-five of the fifty were in Poplar. A case has occurred in Shoreditch, another in Lincoln, another in Paddington, and it has been stated that cases have occurred also in Lambeth, Tulse Hill, and Streatham, but we have not been able to verify these. A scheme of "mass vaccination" is being taken up by many leading business firms in London, whilst the Westminster

[1] British Medical Journal, August 19th, 1922, p. 316.

[2] A Survey of the Present Position of Small-pox and Vaccination affecting this Country. G. A. Wareham, 90/91, Queen Street, Cheapside, E.C.4. (Pp. 23. 1s.)

Guardians have authorized their public vaccinators to vaccinate persons employed in Westminster though resident elsewhere.

THE STRASBOURG MEDICAL DEPUTATION.

ON the evening of Wednesday, November 8th, the Fellowship of Medicine gave a small dinner, hastily arranged, to meet members of the delegation from the University of Strasbourg, who, as we mentioned a fortnight ago, on their return from an inspection of medical schools in America, visited this country with the same object. Sir George Makins, President of the Fellowship, was in the chair, and Sir Humphry Rolleston, President of the Royal College of Physicians and Chairman of the Executive Committee of the Fellowship, was among the hosts. The members of the Strasbourg delegation present were Dr. Maurice Nicloux and Dr. Lucien Pautrier. Dr. Nicloux, who is professor of physiological chemistry in the University of Strasbourg, has done much important work in pharmacology, particularly with reference to alcohol. For a time he was associate professor in the University of Paris, served during the war, and was appointed to the University of Strasbourg at its reorganization in 1920. Dr. Pautrier is professor of dermatology and head of the cutaneous diseases clinic at Strasbourg; he is particularly known for his writings on tuberculosis of the skin. He also served during the war and was appointed to the University of Strasbourg at the time of its reorganization. After the health of the King and that of the President of the French Republic had been duly honoured, Sir George Makins gave a toast to the University of Strasbourg; he recalled its long history and mentioned some of its many vicissitudes, including the period of over forty years during which it was a German university; he also spoke of the fine temper shown by the French in the reorganization of the University, and praised the enterprise of the faculty in sending a delegation to America and Great Britain to study methods of medical teaching and research. Sir StClair Thomson, chairman of the Social Committee of the Fellowship, followed with a spirited speech, in French, during which he expressed the fear that the delegation might not have learnt much in studying the English system of medical education, since there was, in his opinion, no such system, each school having its own individualistic methods. Professor Pautrier, in reply, immediately countered Sir StClair Thomson by asserting that the delegation had indeed learnt much in Great Britain and that the very fact that the schools each had so much individuality was in itself a lesson. He sketched some of the recent developments of the University of Strasbourg and expressed the hope that many members of the British profession would visit the city next year during the celebrations of the hundredth anniversary of Pasteur's birth. Immediately afterwards the company adjourned to the house of the Royal Society of Medicine, where that evening a conversazione was held, during which Sir John Bland-Sutton charmed a very large audience with the address "Spolia nemoralia," published in our columns last week; during his address he exhibited the specimens illustrated in our report of his address. They are to be placed in the Museum of the Royal College of Surgeons of England. The dinner was a model in its way; it was timed for seven o'clock, started a few minutes afterwards, and was over by twenty minutes to nine. Judging from remarks we heard, those present, who included many ladies, enjoyed the dinner far more than if it had been prolonged by many set speeches.

HEALTH PROBLEMS IN THE WEST INDIES.

AN article in *United Empire*, the journal of the Royal Colonial Institute, for November, 1922, by Dr. G. B. Mason, discusses many points of importance in regard to health problems in the West Indies. The need for improved conditions of public health and sanitation and for an efficient and adequately paid medical service has lately been emphasized in the report on the West Indies[1] by the late Under-Secretary of State for the Colonies, the Hon. E. F. L. Wood, and by the resolutions passed by the West Indian Medical Conference at Georgetown, British Guiana, in July, 1921.[2] The latter conference made twenty-three recommendations to the Secretary of State, but Dr. Mason points out that it did not refer to the high infantile mortality and death rate prevailing in the West Indies, which are preventable, to the absence of suitable quarters for married men in many districts where medical officers are required, nor to the provision of an adequate nursing service under Government control. In his paper Dr. Mason gives an analytical table of the different British colonies in the West Indies, their population, revenue, birth rate, death rate, infantile mortality rate, and the percentage of the revenue spent on medical services. In 1920–21 the total trade of Bermuda, the British West Indies, British Guiana, and British Honduras amounted to £66,532,328, and the four colonies of Barbados, Trinidad, Jamaica, and British Guiana each had a total trade of over ten millions. The ratio of total revenue to total trade shows that taxation is light, usually about 10 per cent.; the percentage of revenue spent on medical and allied services varies from 4.44 in Bermuda to 18.82 in Antigua, with an average of about 10 per cent. In the last report of the chief medical officer of the Ministry of Health it is shown that the percentage of the total amount of rates for England and Wales in 1919–20 applied to expenditure on health was 21.9 per cent. The birth rate in the West Indies is much higher than in Great Britain, but the infantile mortality rate is in many cases appalling; it is for instance 270 per 1,000 births in Barbados, 233 in Antigua, and 322 in St. Kitts. In the last named island this may be partly accounted for by the fact that the illegitimate births are more than three times the legitimate births; similarly in Antigua the illegitimate births far exceed the legitimate births, and the children die through poverty, neglect, and ignorance. The infantile mortality of St. Vincent is lower than that of any other of the islands—except the small and prosperous island of Anguilla, with a population of just over 4,000, where special conditions exist—and is lower than that of the other islands in the Windward group; it is suggested that this is due to the fact that trained Government midwives practise there. The facts elicited by Dr. Mason's analysis show an extremely unhealthy condition of affairs in many of the West Indian islands. He has, however, much to say in the way of constructive criticism; he advocates the establishment of a proper system of public health administration in the West Indies, including full-time medical officers of health, sanitary inspectors, district medical officers, and Government district nurses. He suggests that it would be a financial economy to have properly equipped hospitals in the towns, to which all serious cases could be sent by boat or ambulance by the district medical officers. Unless a Government district nurse is within reach, the nursing which a patient could be expected to receive in out-districts in the West Indies is, he states, very primitive, and not of the kind that would help the doctor's treatment. The excuse given, of course, for the prevailing conditions in many of the West Indian islands is their lack of money, but Dr. Mason has performed a valuable public service in showing that even under the present financial conditions of the islands the proportion of the revenue spent upon health is entirely inadequate, and should be increased.

[1] BRITISH MEDICAL JOURNAL, July 15th, 1922, p. 99, and SUPPLEMENT, p. 22.

VENEREAL DISEASE AS A WAR CASUALTY.

AT the War Section of the Royal Society of Medicine on November 13th Surgeon Rear-Admiral W. Bett, in opening a discussion on "Venereal disease as a war casualty," gave figures showing the incidence of venereal disease in the British army at different periods. In 1860 it was 316 per 1,000 of strength; in 1895, 238; and in 1911, 114. In 1922, during the first half of the year, he believed it had come down to 34. In 1888 the percentage of venereal disease to all diseases was 30.7; in 1912, 16.3; and in 1921, 7.5. In 1888 the number of cases of gonorrhoea and syphilis were approximately the same; in 1921 (in the southern command) there

[2] BRITISH MEDICAL JOURNAL, September 24th, 1921, p. 493.

were 3.3 cases of gonorrhoea to 1 of syphilis. The figures for the navy did not fluctuate as widely as the military figures. In 1870 the admission ratio in the navy was 98 per 1,000; in 1913 it was 93; in 1915, 67. Syphilis was supposed to have been very prevalent in the French army during the eighteenth century, and in the Peninsular wars it was rife. In the Crimean war the British army did not appear to have suffered severely; in most cases the disease was contracted at home. The incidence in the Baltic fleet during that campaign was 47 per 1,000, and in the Black Sea fleet, which was farther from home waters, 26 per 1,000. In the South African war the incidence in the British army was diminished, though there was an increase after the war. It was difficult to get precise figures for the European war. In 1917 from 7,500 to 9,000 cases were constantly in hospital in the United Kingdom. In France during the same year it was calculated that there were about 8,000 cases constantly in British hospitals. In both services much had been done to combat the disease. Lectures were given in all ratings, and measures of personal prophylaxis described in detail. Men were made acquainted with the earliest symptoms in order that they might report at once, and concealment had become quite uncommon. His own opinion was that the evil was so great and widespread, and so apt to involve the innocent, that almost any measures were justifiable if only they were efficient. The best method of prophylaxis seemed to be thorough washing with soap and water immediately after the act, together with micturition. Ointments and lotions should also be used if available. It seemed quite clear that "packets" had been of great service in causing diminution of the disease. Much could be done also by the encouragement of games, the provision of reading rooms, and instruction in handicrafts and the like. Colonel P. H. Henderson said that in the command in which he was serving the incidence of gonorrhoea had been reduced very little since the introduction of prophylaxis. In 1913 the ratio was about 24 per 1,000, and in 1921 it was 21. The incidence of syphilis, on the other hand, was 16 per 1,000 in 1913, and 6.12 in 1921. He did not put the whole of this improvement down to prophylactic measures; officers of units were now taking much more interest in sports for their men and in the comfort of barrack life. Sir Robert Hill, Medical Director-General, R.N., said that the incidence of venereal disease in war depended largely on opportunity. In the big ships of the Grand Fleet, on which shore leave was given only once a year, the incidence was lower in war than in peace; whereas in the destroyers, which could not go on for longer than three months without refitting, the conditions as to venereal disease became alarming—at one period one-third of a ship's company was infected. Major A. T. Frost thought that prophylactic outfits had failed, not so much because they might not prevent the disease, as because they were difficult for the average man to use. Sir William Macpherson agreed with Rear-Admiral Bett that venereal disease was not strictly a war casualty: the incidence per thousand in the British army in France in war-time was relatively low as compared with the peace-time figures. Sir Percy Bassett-Smith, R.N. (ret.), expressed the view that the ratio of venereal disease was not higher in the services than in the civil community. Until notification became compulsory there was little chance of preventing the disease; though public opinion was against compulsory notification, the evident danger arising from the number of people who left the clinics before their cure was complete might be the thin end of the wedge of notification. The Chairman, Sir A. P. Blenkinsop, remarked that the effect of opportunity was strikingly brought out in the Mesopotamian campaign, where the incidence, as compared with other fronts, was low, until the borders of Kurdistan and Persia were reached. In Persia at that time whole populations were in dire necessity, and women were driven to prostitution for the most trifling rewards. If prophylactic outfits were to be continued they must be simplified; the present arrangement was cumbersome and inefficient.

A CO-OPERATIVE CLINIC IN PSYCHIATRY.

At the Court of Governors of the Middlesex Hospital, to be held on November 30th, we understand that the Board will present a report on proposals for co-operation between that institution and St. Luke's Hospital, in the City of London. The object of this working arrangement between a large general hospital and a registered hospital for mental disease is, briefly, to improve the treatment of early mental and functional nervous disorders. The scheme, which has been under discussion for some years, aims at co-operation in respect of funds, material, personnel, and experience in management, and thus at securing greater economy in administration, with more rapid and efficient treatment of the patients. It is proposed to establish two new wards for male and female in-patients at the Middlesex Hospital, where cases will be treated by members of the medical staff of St. Luke's Hospital under the care of its trained mental nurses. In addition a special out-patient clinic will be set up for dealing with border line cases; this, in effect, will constitute a psychiatric section of the neurological department of the Middlesex Hospital. It is hoped that in this way patients with symptoms of early mental disorder will be encouraged to seek prompt treatment and advice. Those admitted to the new psychiatric wards will be on the same footing as ordinary patients in the general wards of the hospital. Patients attending under this scheme will have the advantage of the full resources of a general hospital, and of the services of a staff skilled in the treatment of mental disease; the need for certification may thus be avoided and the prospects of cure improved. We cordially welcome this development of the work of the two institutions; its results will be watched with sympathetic interest by the medical profession. In our issue of September 23rd, at page 577, we mentioned the out-patient clinic in psychiatry which has been established at Cardiff under Dr. Edwin Goodall, by co-operation between the City of Cardiff Mental Hospital and the King Edward VII Hospital. The clinic is held in the out-patient department of the general hospital, but until suitable indoor accommodation is also available this scheme is regarded by Dr. Goodall as incomplete. The success of the Middlesex and St. Luke's scheme in London would no doubt strengthen his hand in pressing for full development of his plan, although it seems a pity that Cardiff, having started so well, should hesitate to make its scheme complete; the hesitation may perhaps be due to the fact that the King Edward VII Hospital is too small for a centre such as Cardiff and cannot be enlarged on its present site. The difficulties of an out-patient mental department without beds are graphically described in a letter by Dr. R. H. Steen, printed at page 998 of our present issue.

THE NOBEL PRIZES, 1921, 1922.

The Nobel Prize for Chemistry for 1921 has been awarded to Professor Frederick Soddy, F.R.S., Lee's Professor of Inorganic and Physical Chemistry, Oxford, whose work on the radio-active elements and on the constitution of the atom is so well known; that for 1922 is awarded to Dr. Francis William Aston, F.R.S., Research Fellow of Trinity College, Cambridge, who has made many important investigations into the electrical discharges in gases and with regard to isotopes. The Nobel Prize for Physics for 1921 has been awarded to Professor Einstein for his work in theoretical physics, especially the discovery of the law of photo-electric effect; and that for 1922 to Professor Niels Bohr of Copenhagen in recognition of his investigations into the structure of atoms. The Nobel Prize for Literature for 1922 has been awarded to Señor Jacinto Benavente, the Spanish dramatist.

On Wednesday next, November 22nd, at 5 p.m., Professor H. C. Jacobaeus, of Stockholm, will give a lecture at the Royal Society of Medicine on the practical importance of thoracoscopy, especially in the pneumothorax treatment of pulmonary tuberculosis. It is understood that he will exhibit the instruments he uses and show some cases.

England and Wales.

London School Medical Service.

The inspecting officers of the Board of Education have made certain criticisms of the school medical service of the London County Council. They have called attention to the need for further administrative supervision at the treatment centres in order that time may not be wasted by failure to supply medical and dental practitioners with a full complement of cases at each session, and to the need for further professional supervision, especially with regard to the administration of anaesthetics, operation treatment for tonsils and adenoids, and dental work. The inspectors state that the skill of those appointed to do operative work and administer anaesthetics at the centres should be in no way inferior to that available in the best managed hospitals. Apart from these criticisms, the inspectors describe the Council's scheme as admirable. In reply, the London Education Committee states that the inspection in 1922 took place at an unfavourable time. During 1921 the centres were full to overflowing, but in 1922, at the time of the inspection, there was a falling off in many areas. Among other reasons for this were the great prevalence of infectious disease and also the unjustified attacks in a section of the public press on throat operations. The Education Committee is addressing itself to the standardization of the qualifications and experience required of medical officers, and has now agreed that for any appointment involving specialist work a tenure of hospital or other appointments affording special opportunities for acquiring experience, or some special academic or post-graduate study or recognized proficiency and experience in the particular capacity for which the service is offered, shall be required. It has also been decided that no surgeon shall be required, as a rule, to operate on more than eight tonsil and adenoid cases per session of two and a half hours (hitherto the number has been ten). The British Medical Association has asked that a clause might be inserted in agreements prohibiting visits to the centres by unauthorized persons, and the Education Committee accordingly has decided that agreements shall provide that no lay person other than the Council's organizer shall be admitted to the consulting room during treatment without the consent of the doctor. The existing agreements provide that the committees of school treatment centres shall, if required by the Council, certify whether a child patient is fit to attend school during the period of treatment; the Education Committee considers that the doctor in attendance at the centre, and not the committee, should so certify. It has also been arranged that a time-book shall be kept at each centre in which the hours of arrival and departure of the medical staff shall be recorded.

Birkenhead Medical Society.

The annual report of the council of the Birkenhead Medical Society states that there are now on the membership roll the names of 55 members and 2 associated members. During last session the council met four times. Six ordinary meetings were held, at which interesting clinical papers were read and discussions took place, and on one occasion cinematograph films showing bacteria were exhibited. The average attendance was larger than in the previous year. At the annual dinner, held at Birkenhead Town Hall last April, 28 members and 26 guests were present. The following officers and members of council have been elected for the ensuing session: President, Dr. W. A. Pierce; Vice-Presidents, Dr. R. Wyse and Dr. H. Laird Pearson; Honorary Treasurer, Dr. W. A. Pierce; Honorary Secretary, Dr. D. Morley Mathieson; Members of Council, Drs. Fountain Browne, Fardon, Hocken, Francis Johnston, and Owen. The society was founded in 1856.

Tuberculosis in Birmingham.

The report on tuberculosis of the Birmingham Public Health Department states that new cases have been much fewer, the deaths less numerous, and the incidence and mortality among children considerably diminished during the year, both as regards pulmonary and non-pulmonary tuberculosis. There has been a continuous decrease in the number of cases notified and of deaths from tuberculosis since 1913; in that year 5,196 cases were notified, and there were 1,341 deaths—a death rate of 1.53 per thousand, while in 1921 2,247 cases were notified, and there were 1,035 deaths—a death rate of 1.13 per thousand. As regards preventive measures, the antituberculosis administration in Birmingham is carried out by a staff of fifteen tuberculosis visitors, including a superintendent, and the efforts of this staff are directed, first, to induce the patient to obtain early treatment and to follow out the advice given, and second, to improve some of the general social conditions which tend to spread infection. In regard to the treatment of tuberculosis, at the Broad Street Centre for out-patient treatment a total of 31,204 attendances was made by old and new patients, and 815 new patients attended for treatment. There were 670 beds available for sanatorium and hospital patients, and during the year 2,262 patients were admitted for observation, instruction, treatment, or isolation. At the General Dispensary Tuberculosis Department there was a total of 12,371 attendances for treatment.

Scotland.

Royal Faculty of Physicians and Surgeons.

The annual meeting of Fellows of the Royal Faculty of Physicians and Surgeons, Glasgow, took place on November 6th, when office-bearers were appointed as follows: President, Dr. W. G. Dun; Visitor, Dr. W. R. Jack; Treasurer, Mr. J. Hogg Macdonald; Honorary Librarian, Dr. E. H. L. Oliphant; Councillors, the president, visitor, treasurer, librarian, Dr. James A. Adams (as Faculty representative to the General Medical Council), Mr. Henry Rutherfurd, Dr. A. K. Chalmers, Mr. J. Mason Noble, Sir Kennedy Dalziel, Dr. A. Freeland Fergus, Mr. A. Ernest Maylard, and Mr. J. Hogarth Pringle.

Child Welfare in Edinburgh.

At a meeting of the Edinburgh Town Council on November 2nd a recommendation from the Public Health Committee to close Gogarburn House—a convalescent home associated with the child welfare activities of the council—at the end of the current financial year, was adopted by a large majority. It was stated that the committee had realized that the proper way to treat children between 2 and 5 years of age was not in special institutions. Gogarburn House was intended to house a hundred children, but it had never had more than forty-five, and the expense of each child worked out at £150 a year. It had cost, including the outlay on alterations, something like £10,500; when it was bought an isolation building was found necessary, and for this a hut was bought at a cost of £70, but to convert the hut for the accommodation of children cost over £2,000. It had been found impracticable to treat children up to 2 years of age so far out of reach of the town, the parents, and the doctor as at Gogarburn. If the children were given a fair start in life between the ages of 1 and 2 it was believed that they should not need treatment after the age of 2.

The Census of Scotland, 1921: County of Bute.

The county of Bute[1] consists of seven inhabited islands in the lower part of the Firth of Clyde—Bute, Arran, Great Cumbrae, Little Cumbrae, Holy Island, Inchmarnock, and the lighthouse islet of Pladda, south of Arran. The whole group is within the most popular holiday region of industrial Scotland, and postponement of the census from April till June has completely vitiated the statistics, alike as to amount of population, its relation to house accommodation, and ages, sex, and occupations. Rothesay, for example, shows an increased population of 63.7 per cent., and Millport of 261.5 per cent., whilst in 33,711 of a total enumerated population in the county no less than 13,745 were returned as born in Lanarkshire. All these things being so, it is needless to enter into any details of the contents of the report, excepting, perhaps, to note that 1,453 persons were Gaelic speakers, or 628 less than in 1911. The whole 1,453 were bilingual.

Glasgow Medical Lunch Club.

At the usual meeting of this club, held on November 9th, Dr. W. L. Reid presiding, Mr. D. M. Cowan, M.P. for the Scottish Universities constituency, was present as the guest of honour. After lunch Mr. Cowan gave a short address, touching on several matters of medical legislation, and impressing on

[1] Vol. i, Part 10, of Census of Scotland, 1921. H.M. Stationery Office, 23, Forth Street, Edinburgh. 4s. 1½d. post free.

members the need on the part of lay members of Parliament for guidance from the medical profession on all matters of medical importance. He said that he would welcome some authoritative lead from the profession on all legislation pertaining to medicine. Dr. James Dunlop (Shettleston), in expressing the thanks of the members to Mr. Cowan, assured him that the medical profession in Glasgow would gladly help him in the matter of medical information.

Sydney.

Retirement of Dr. G. E. Rennie.

Under the regulations of the Royal Prince Alfred Hospital, Sydney, fixing the age limit for retirement from the active staff at 60 years, Dr. G. E. Rennie has retired from the position of senior honorary physician and has been appointed on the honorary consulting staff. Dr. Rennie gave a farewell address to the students and the honorary medical staff. He, along with Dr. F. Antill Pockley, who has also recently resigned the lectureship in ophthalmology in the university and the position of senior ophthalmic surgeon to the hospital, were entertained at a complimentary dinner by the members of the honorary medical staff.

Industrial Hygiene.

At the invitation of the industrial department of the National Y.W.C.A. the welfare nurses employed in business houses in Sydney recently heard an address from Dr. Lanza, the Commonwealth expert in industrial hygiene. He first sketched briefly the development of industrial hygiene work, beginning with the effort at accident prevention. The next step was in regard to dangerous occupations, such as those involving the risk of phosphorus or lead poisoning. After a time it became evident that there were problems of health not so clearly defined as accidents and occupational diseases but yet involving an economic loss to the community. The employment of the trained nurse in the industrial plant had been a great step forward. The work of the nurse at the dispensary was much more than attention to minor accidents—it was preventive work and was of great value from the business as well as the human point of view. He emphasized the necessity of the nurse keeping proper records of all cases treated, showing the nature of the injury, the amount of time lost, and the department from which the patient came. In this way it was possible to compute how much time was lost to business. A run of some particular ailment in one department might point to some defective condition in it, such as the lighting. Dealing more especially with the industrial prospects of Australia, he said that the natural development of industry in a country so largely wool-producing would be in the direction of an increasingly large number of women workers. While there was a variety of opinions as to the effect of industrial conditions on the health of women, there was not much accurate information; it was necessary, therefore, that those who were working in plants employing women should keep accurate records if any scientific conclusions were to be reached. As an illustration of the value of deductions to be made from such records he spoke of one firm which had experienced heavy loss in selling silk reels because of bad matching. The health department on investigating this matter found that headaches were common among the employees, and that these were due to defective eyesight. Under appropriate treatment with glasses the trouble disappeared and the firm's loss also ceased.

Proposed Cancer Home.

It is proposed to build a home for cancer patients in the grounds of the Home for Incurables at Ryde, near Sydney. The urgent necessity for some accommodation for patients suffering from cancer has long been recognized, but the authorities of the Home have not been able to accommodate these cases. Plans for the proposed institution are now being prepared. It is estimated that the building will cost £27,000, and of this amount £23,000 is already in hand. The necessity for this home is obvious from the striking figures quoted by the Government statistician. During the years 1914–20 more patients died from cancer and other malignant growths than were killed in several of the spectacular battles on the Somme, the total for seven years for the whole of Australia being 28,556. The statistician points out that the male death rates from cancer in 1920 were in excess of those from tuberculosis in all the States except Western Australia, while the female deaths from cancer were in excess in all the States. While the death rates from tuberculosis show a general tendency to decrease, the death rates from cancer display an increase in nearly every recent year.

Attention was directed to the question of the increase in cancer and the reported advances made in its treatment by *x* rays by a question asked in the Legislative Assembly by Dr. Richard Arthur: "In view of the favourable reports of medical authorities that cures of cancer can be effected, and other forms alleviated, by the use of *x* rays, will the Minister of Health consult with the experts with a view to securing a modern *x* ray plant, and place the necessary sum on the estimates for this purpose?" The Minister agreed to adopt this course.

Correspondence.

INSULIN AND DIABETES.

Sir,—In connexion with Professor J. J. R. Macleod's interesting article on insulin and diabetes, and the difficulties of manufacture arising from the circumstance that the trypsin of the pancreas attacks and destroys the insulin, I may perhaps suggest to those working on this subject that the trypsin might be neutralized and got out of the way by pounding up the pancreas in serum.

I have elsewhere[1] drawn attention to the relevant fact that the erosion of the abdominal walls by tryptic ferment, which is so great a source of misery in duodenal fistula, can be very easily and effectively combated by calling in to our aid the antitryptic powers of the serum—in other words, by applying lint soaked in normal horse serum.—I am, etc.,

London, W., Nov. 11th. Almroth E. Wright.

Sir,—It has been known for some time that the injection of a fresh extract of the pancreas reduces the sugar content of the blood in normal animals, and on this point the experiments quoted by Dr. Thomson[2] confirm the observations Howard, Forsyth, and I published in 1921.[3] For a much longer time it has been recognized that such injections temporarily improve the glycosuria and hyperglycaemia following pancreatectomy, but numerous attempts to apply this knowledge clinically to the treatment of diabetes have ultimately ended in failure, in spite of an ephemeral success in some instances.

The most satisfactory results appear to have been obtained by Zuelzer and his associates,[4] who employed an expressed extract of the gland treated with alcohol. Six cases were given injections of this preparation, and the effects were reported to be uniform and constant, the sugar, acetone, and aceto-acetic acid always diminishing and usually disappearing from the urine in two to three days. The after-history of these cases has not been reported, nor have further successes been claimed for the treatment. Later Forschbach, employing the same method,[5] obtained similar results with depancreatized dogs, but was not so fortunate with human diabetics, for, although he found a temporary reduction in the glycosuria, the acetone excretion was not affected, the temperature was raised, and other serious symptoms developed.

The main point in which the earlier work of the experimenters in Macleod's laboratory differed from that of previous observers appeared to be that they had succeeded in devising a method of preparing an extract of the islands of Langerhans, free from the digestive ferments of the pancreas, by making use of Schulze's observation that ligature of the ducts leads to degeneration of the glandular acini, while the cell islets remain intact, and later by taking advantage of Ibrahim's statement that the foetal pancreas is almost free from proteolytic enzymes. Now, however, they seem to have abandoned these procedures and reverted, more or less, to the methods previously adopted by Zuelzer and Scott, using the whole pancreas of the full-grown ox and alcohol as a means for removing the protein and digestive ferments. The strict propriety of the name "insulin" for this preparation is therefore open to question.

As was the case with Zuelzer's, and later with Scott's, preparation, the extract now being used by the Toronto workers gives encouraging results with depancreatized

[1] *Technique of the Test and Capillary Tube.* Clinical Appendix on the Antitryptic Function of the Serum.
[2] British Medical Journal, November 11th, 1922, p. 948.
[3] Ibid., October 15th, 1921, p. 586.
[4] *Zeit. f. exp. Path. u. Therap.*, 1903, v, p. 337.
[5] *Deut. med. Woch.*, 1909.

animals, but I am quite in agreement with Dr. Thomson when he says it is doubtful "whether the condition of animals after that operation is exactly equivalent to the extraordinary variety of conditions in man which are collected under the name diabetes." My experience with the methods of differential diagnosis that I and my fellow workers have recently elaborated has suggested that insufficiency of the internal secretion of the pancreas is the dominant factor in less than half the cases of glycosuria met with in practice in this country, and one would therefore expect that "insulin" would be useful in some such proportion of diabetics, but as it must be administered intravenously or subcutaneously, and the effects are transient, it is evident that it is not a method of treatment to be lightly undertaken or that can be continued indefinitely. As yet the clinical data are too scanty for a definite conclusion to be reached, but so far as can be seen at present it seems likely, as Macleod himself has said,[1] that insulin will be chiefly of value in tiding patients over those crises which are frequently uncontrollable by other means. It is advisable that stress should be laid upon this statement in view of the optimistic forecasts as to its curative properties which have been so widely circulated in the press recently, thereby raising exaggerated hopes, which are not likely to be fulfilled, in the minds of many diabetics.—I am, etc.,

London, W., Nov. 11th. P. J. Cammidge.

THE TREATMENT OF ACUTE SALPINGITIS.

Sir,—After reading the paper by Dr. Campbell on the treatment of salpingo-oöphoritis and the discussion thereon at the Annual Meeting of the British Medical Association, reported in your issue of October 14th, I was surprised that no mention was made of treatment of acute suppurative salpingitis by salpingostomy—that is, a complete laying open of the tube from the abdominal ostium to the uterine cornu, followed by drainage of the pelvic cavity for a variable number of days. So crude a procedure as the removal of the suppurating tube is advocated by Dr. Campbell at the earliest possible moment, apparently on the baseless analogy drawn between suppurative inflammations of the tube and appendix. The reasoning is that apparently both tube and appendix have something of the same gross appearance, both are liable to contain pus, and both may cause a varying degree of peritonitis, therefore why should not the suppurating tube be treated in exactly the same manner as an appendix in a similar condition? There is so patent a confusion of thought in this reasoning that some of those who took part in the meeting assumed that Dr. Campbell had put forth his thesis chiefly in order to provoke a discussion which otherwise might have languished. But in his closing remarks Dr. Campbell is reported as having maintained his ideas of the analogy of the appendix and the tube, and we must therefore accept his views of treatment as his considered judgement.

To my mind the analogy breaks down when we remember the fundamental differences in bacteriology and morbid anatomy of inflammation of the appendix and the tube and in the clinical differences and dangers of the two diseases. In the one case is a virulent combination of streptococcus and *B. coli* derived from the bowel, liable, as we know, to set up a rapidly disseminated general suppurative peritonitis, usually fatal; while in the second case the organism is ordinarily the gonococcus (except in puerperal cases, when the streptococcus is often present in addition), a microbe of much less danger to the peritoneum, and seldom the cause of a spreading peritonitis. The perforated appendix is virtually of the same order of lesion as the perforated colon, for by its rupture it liberates the same organisms into the peritoneum—an accident of the greatest potential danger.

Moreover, the appendix is situated in the abdominal cavity proper, while the tube leaks its pus into the depth of the pelvic cavity (puerperal cases excepted), where it is in the large majority entirely shut off from general dissemination.

Treatment of the acutely suppurating tube, therefore, is seldom required for an extending general peritonitis, but should be designed with these objects:

1. To prevent the persistence of a chronic pelvic peritonitis, due to interstitial salpingitis.
2. To prevent the formation of a pyosalpinx.
3. To preserve the patient's chances of future child-bearing.

Removal of the tubes will ensure the first two conditions provided the ovary is not infected, but it will condemn a woman, frequently young and recently married, to a life of sterility.

Salpingectomy is an unnecessarily harsh treatment, and, in my opinion, should not be practised unless the tube has been previously damaged beyond functional repair by former attacks of inflammation. For a first attack complete salpingostomy is a more rational form of treatment of the tube. First, by affording wide evacuation of pus along the whole lumen, it allows resolution of the tube wall, rapidly restoring it to a condition indistinguishable from the normal slit tube (as proved in one of my own cases at a subsequent *post-mortem* examination following death from pneumonia); secondly, the formation of a pyosalpinx is obviously impossible; and, thirdly, the tube, after full resolution, is able to function again as a gutter along which ova can be conveyed to the uterus.

The greater number of cases of salpingitis are mild enough to escape operation, but where I join issue with Dr. Campbell is that, having opened the abdomen, salpingostomy is a more rational mode of dealing with the tube than salpingectomy.—I am, etc.,

London, W., Oct. 31st. Aleck W. Bourne.

[1] *Proc. Amer. Physiol. Soc.*, December, 1921.

PSYCHO-ANALYSIS.

Sir,—The leading article in your issue of November 11th tempts me to urge the foundation of a special institution for psycho-analysis—call it hospital or clinic or what you will.

To your readers facts about my work may be of little interest, but at the risk of being egotistical, I feel I must give them as they are not hearsay evidence, and I believe can be confirmed by the experience of others.

At King's College Hospital, Denmark Hill, I have an out-patient department for mental diseases. The following patients have consulted me:

A young man who has, as the principal symptom, the fear that he will swallow one of his buttons. At frequent intervals during the day the unfortunate youth is compelled to count each button on his clothing lest, perchance, one may be missing, and he may have swallowed it. He is virtually a prisoner, as he cannot even go into the tiny garden at the back of the house for fear he may swallow a fly, or spider, or something else.

A young girl has an uncontrollable impulse to walk to the left. Examination by experts in other departments can find no physical basis for this symptom.

A young girl has auditory hallucinations recognized by herself as hallucinatory. The "voices" are very disgusting and cause her much distress.

A man has irrepressible blasphemous thoughts which he hates and which interfere with the proper discharge of his duties. Another has loss of memory for a definite period of his life extending over years. Then there are the cases of anxiety neurosis—a numerous class.

These are only a few illustrations out of many. I wonder if the majority of your readers realize the unhappy plight of these unfortunate people. Their sufferings are intense. In most cases all social life is impossible for them and in severe instances they are unable to engage in any occupation. What is to be done? Treatment on ordinary medical lines is useless in my experience. With the help of several enthusiastic students I am able to give therapeutic conversations and other psycho-therapeutic measures with a certain amount of benefit. These procedures are not to be confused with a course of psycho-analysis and are of value only in early cases. But my time is limited, numerous other cases await my attention, and I personally cannot undertake a true psycho-analysis.

Attached to the Neurological Clinic and my own is a department for psycho-therapy. The officer in charge has recently resigned, and his successor has not yet been appointed. So I can speak impersonally when I say that even he cannot be expected to give the time required for a full analysis of all the cases which could be sent to him.

Many of these cases also need in-patient treatment. They require rest and removal from domestic worries and injudicious relatives. The mental hospital is not the place for them. They are not insane in the ordinary sense of the word. No general or special neurological hospital will receive them. The Maudsley Hospital may help, but I fear will soon be filled with early cases of the psychoses. The only thing to be done, therefore, is to found a special hospital with out-patient clinic.

It should be staffed with whole-time, well-paid, and comparatively numerous medical officers. Specialists of all kinds should be attached for consultations. Other details are unnecessary for the moment. The advantages of such an institution would be many: I name a few as illustrations. Cases such as I have instanced would receive proper treatment.

Extensive study could be made upon them and results and details could be published in a manner which is not possible in the case of private practice. Research work on the lines indicated by your leading article could be undertaken, and it would afford a splendid opportunity for post-graduate teaching.

Where is the money to be found? I have no doubt that the public would provide the money if the profession were to endorse such a scheme. The first thing is to convert the medical profession. Hence this letter.—I am, etc.,

R. H. Steen.

City of London Mental Hospital, Dartford, Kent, Nov. 13th.

Sir,—I was astonished to find from Dr. Steen's letter (November 4th, p. 894) that he apparently believes that thought can occur without physiological nerve and brain activity, and that he considers belief in the latter to be demoralizing. Thus he would condemn every scientist who uses it as a working hypothesis as demoralized. He then recommends the anxious inquirer to study Dr. Hart's "little book" in which he himself has such implicit faith. This seems to me very much like suggesting a Sunday school tract as a serious contribution to a discussion on some abstruse problem in exegesis, for I can find nothing either in Dr. Steen's letters or Dr. Hart's book to justify faith in what the writer of your excellent leading article has called "the diagnostic tools" of the psycho-analysts. The question of suggestion has been ably dealt with by Dr. Elder. To respond with a direct negative in no way disposes of it.

Throughout Dr. Steen seems to reject that which according to knowledge and analogy is probable and to accept that which is so improbable as to require much to be taken on trust in order to make it appear conceivably possible. Under these circumstances it is surprising to find your correspondent indulging in cheap sarcasm with regard to the former. In the third paragraph of his letter there is something remarkably like an attempt to avoid the main issue if not to side-track it.

Dr. Steen is good enough to ask for suggestions as to literature. In all seriousness I would recommend a study of psychology—such works, for instance, as *Psychology from the Standpoint of the Behaviourist* by John B. Watson, *Human Psychology* by Howard Warren, and *Human Behaviour* by Stewart Paton. In the last he will find the following sentence: "We now know that there are no specific differences of kind but only those of degree between the reflex activities of the protozoa and the highest mental processes of man." The perusal of such works will show Dr. Steen that psychological problems can be studied by the aid of physiology and logic. Assumptions, assertions, and sarcasm may have their uses, but are out of place in scientific controversy.—I am, etc.,

Harrogate, Nov. 12th. P. McBride.

Sir,—In connexion with the correspondence in your columns on psycho-analysis I trust you may find room for this (the first) intimation of a discovery on the subject of dreams which you may agree to be of epoch-making importance—or you may not.

The origin was very simple. I dreamt that the newspaper had not come; and where this might have led I cannot say, but—perhaps fortunately for the future of psychology—I awoke, and my thoughts turned at once to the interpretation of the dream. The thing seemed so simple and apparently so innocent that I knew from my Freud it could only refer to some gross and coarse erotic desire, of a nature so base that I could only be thankful that I was unable to recognize it; and I knew that it remained unsatisfied, for otherwise it could not have caused my dream. But I soon became conscious of mental conflict, and I lay awake and thought. Was Freud right? Of course he was—no, he wasn't. Was I really of so base a nature? Of course I was—no, I wasn't. Ever-increasing conflict. The strain became almost intolerable, and might well have upset better balanced minds than mine when—unexpectedly, mercifully—the conflict was resolved, not by the discovery of the subconsciously desired orgy, but by the recognition of a truth which underlies, and incidentally both confirms and the opposite (upsets), all that Freud has taught. For I had interpreted my dream—and, as a necessary corollary, a sense of peace came over me. "The newspaper had not arrived!" At last I knew what it meant, and my conviction became complete when the maid came in with my early cup of tea—it meant that I wanted my breakfast.

From this simple explanation of this simple dream emerges a new theory of dreams, based on the work of Freud, but going deeper and incriminating the most primitive of all instincts. Obviously all dreams refer to food and to the desire for food—an instinct more all-prevailing and, to some natures at least, more frequent even than that of erotic desire.

A few of my deductions will show how completely this theory explains all dreams. All newspapers refer to breakfast, or the opposite (evening papers). All very hard objects are either bones or oyster shells (inedible) or the opposite (soft, inedible—for example, sand). All soft objects are puddings or, if very soft, soufflés—or the opposite (not soufflés). An india-rubber ball is clearly gristle (can be chewed but not swallowed) or the opposite (*must* be swallowed—conflict; for example, party with all eyes on the gristle-chewer). All colours I find refer to drinks—for example, yellow stands for beer, or the opposite (not beer—conflict); while green stands for undrinkable things generally (accepted—no conflict), or the opposite (Chartreuse; idea again accepted—no conflict). All rhythmic movements—riding, organ-grinding, the treadmill, etc.—obviously refer to mastication, and children who grind their teeth at night have greedy natures, or the opposite (ungreedy natures); and so have we all, if we will only be honest with ourselves.

But I take up too much of your space. Anyone can elaborate the theme to suit his fancy. As I desire to avoid an overwhelming correspondence, I beg to subscribe myself—Obediently yours,

October 31st. A. Dreamer.

LILLIPUTIAN HALLUCINATIONS.

Sir,—The attention called to the above syndrome in the Epitome (November 4th, 1922, No. 331) is of interest because of its rarity and the fact that it has so far received little notice in the textbooks and literature, and, therefore, the following case of a bedridden old lady may be worth recording.

Mentally she was exceedingly clear in every other respect, but she used to describe to me most vividly pictures of hosts of very little people who appeared to her to be working upon buildings, fortresses, etc., all within the range of her own small room, the operations apparently taking place around and about the foot of the bed, and the furniture. She was generally quite interested in watching and describing their work, hundreds being employed and miniature horses and wagons used to haul timber and stone, and she would enter into details as to the way they were dressed and harnessed. Some of the figures apparently worried her a little because they ranged themselves just outside the window and gazed at her as she lay in bed, but it was not until some visiting ecclesiastic tactlessly told her that they were "bad angels come to punish her for her sins" that they seriously upset her, and it took considerable time and effort to dislodge this wicked suggestion from interfering with her otherwise peaceful serenity.

Her descriptions conjured up scenes similar to those met with in *Gulliver's Travels*, though I doubt very much whether she had ever read, or even heard, of Swift's inhabitants of Lilliput.—I am, etc.,

Lichfield, Nov. 4th. F. M. Rowland, M.D.

SERUM BY THE MOUTH.

Sir,—In the Journal of October 14th Dr. D. Montgomerie Paton of Melbourne states that I used serums orally in 1892, and adds "where Dr. Allison admits he still is my work begins." I, however, am hardly where I was in 1892, my statement being: "I think 5,000 units of (antidiphtheria) serum more powerful in this way (raising body resistance) than 20,000 units of any other variety. Why I do not know, but it cannot be the horse serum (that is, the common basis) *per se*."

If Dr. Paton can tell me I shall be glad. And perhaps I may be allowed to use, Mr. Editor, some words of your own, as uttered in the Journal of October 28th in this connexion:

"Whether it be the chemist observing an unexpected precipitate, or an astronomer measuring the variability of a star, the new phenomenon must be accurately recorded and verified before the explanation is sought. The observation of the effect must precede the cause; the existence of a problem must come before its solution can be considered."

And it often requires, I think, different types of minds to make the whole of a problem complete. The experimental mind makes the experiment; the observing mind notes the occurrence; the analytical mind seeks the explanation. But the observation precedes and causes the explanation.

The work of Sir Patrick Manson is deservedly honoured, but has the Peruvian (?) medicine man who discovered cinchona bark and the treatment of malaria had his fair share of recognition? And of the two—Manson or medicine man—which was really the greater human benefactor? Malaria (its hot stage preventing sweating, which means torture in the tropics) was the problem, the mosquito was its solution, but quinine was its cure. And the malaria and quinine came first.

And so in a less degree with serums and vaccines orally. The administration comes first and causes the explanation, which comes later. Only the observation is not where it was in 1892, because it has been extended by the giving of antidiphtheria serum orally in follicular tonsillitis, pneumonia, and influenza. In doing so I think I have proved that this serum is not specific for diphtheria alone, but that it is a specific (and a potent one) in raising the resistance of the body to diseases other than diphtheria.

Whilst the practical results appeal to me far more than the explanation, if Dr. Paton, in *New Serum Therapy*, can say why the effects of antidiphtheria serum are so much better than other serums, I shall be very pleased to have the explanation, because it may mean that others will try the oral methods and the extended use of this valuable remedy. And this will be to the common good, as in my opinion the oral method reduces the incidence of anaphylaxis and other drawbacks of the hypodermic method, the dosage being the same.—I am, etc.,

T. M. ALLISON, M.D.,
Honorary Physician to the Wingrove Hospital, Newcastle-upon-Tyne.

November 4th.

P.S.—Since this was written there has been published in the EPITOME of November 11th a note showing that the oral administration of vaccines is exciting interest abroad. The note states that Nicolle and Conseil have brought forward evidence in favour of the efficacy of this method in Malta fever and bacillary dysentery.

ETIOLOGY OF RICKETS.

SIR,—The interesting discussion on the causation of rickets in the BRITISH MEDICAL JOURNAL of November 4th (p. 846) must appeal to many general practitioners. As one of them, I may be permitted to offer a few observations on the disease.

There are, I suggest, two factors, and only two, concerned in its causation: (1) the state of the air the child breathes—the air factor; and (2) the kind of food the child is fed on—the food factor. Both these factors act and interact, so that it is, in some cases, not easy to determine the predominating factor. I believe in the vast majority of cases of rickets the air factor is the predominating one. A father and mother, belonging to the poorer paid members of the working class, live in a kitchen with four or more children. The window is closed; likewise the door of the apartment. These are the ideal conditions for breeding rickets. And here, in accordance with the theory involved, it is not usually the first born that suffers from rickets. It is the "late arrivals" on whom the brunt of the disease falls. It is, in my opinion, the poisoned state of the air the child breathes that is the great factor in developing the disease. It does not necessarily follow that rickets is due to a defective supply of oxygen, although if the kitchen window is kept open for three or four inches by night and by day the disease will, as in the cases I have watched, probably become arrested.

The early symptom of rickets is sweating about the head, especially at night; the hair in consequence becomes matted. Although convulsions in childhood are generally ascribed to the cutting of teeth, indigestion, etc., I think there is usually a rickety basis. My belief is now so strong that I go so far as to tell the mothers of children who have fits that if they will keep the window open night and day their child will never have a fit.

I am not so competent to discuss the food factor. But my daughter, in the early months of her life, was fed on pasteurized milk. She developed signs of rickets, sweating about the head, and a tendency to lunar curves of the tibias. There was nothing for it than to put her back on plain cow's milk and run the risk of bovine or other infection. The signs of rickets disappeared, but the tonsils and the adenoid tissue in the roof of the pharynx became infected. I have little doubt that these disorders are due to bovine infection.—I am, etc.,

Glasgow, Nov. 6th. JOHN T. MACLACHLAN, M.D.

SIR,—I have been reading the discussion on the etiology of rickets in the JOURNAL of November 4th with great interest, and cannot believe it is a disease due entirely to faults in diet. I was in charge of the Madras Maternity Hospital for some years, and over 20,000 patients passed through my hands, and I can recall no case of a truly rachitic pelvis. There were numbers of cases of flattened pelvis, and this we attributed to the habit of children and young adults of carrying heavy pots of water on their heads. A few of the higher caste Brahmin and Gosha Mohammedan women came as inmates. The rest of our patients consisted of Europeans, Eurasians, Mohammedans, and Hindus, the last largely predominating.

The diet of the poor in South India consists of raggi, cumbu, or cholum, with a few pieces of meat in the curry at night, now and again. Rice is not the staple diet of the native of the south, as pointed out years ago by the late Surgeon General Cornish, C.I.E.—rice to the poor is a luxury. Ghi (clarified butter) or gingelly oil are used in cooking. Butter milk is occasionally drunk.

Children run about in the sun as soon as they can toddle, and are naked except for a string round their middle. They take the breast up to 3 years of age, and are dosed almost daily with castor oil. In the *Indian Medical Gazette* I used to read the reports of the midwifery hospitals in the north of India, and the number of operations required on account of rachitic pelves was large. I cannot certify the diet of the poor in the north, but bajri—a millet—seems the staple article; moreover, they eat chupatties, made of unleavened flour and ghi, which are not used in the south. The diet in the north is as nourishing or more so than in the south; in the latter rickets is unknown, whereas in the former it is a common complaint. In the south it is never cool; in the north frost prevails; the sun is, however, hot. In Iceland rickets is stated to be unknown.

Surely there is something more than diet to account for such a discrepancy. Most diseases nowadays are due to microbes or infection—why not rickets?—I am, etc.,

A. J. STURMER,
Clifton, Bristol, Nov. 7th. Lieutenant-Colonel I.M.S.(ret.).

TREATMENT OF FEVER.

SIR,—In your issue of June 4th, 1921 (p. 835), you were good enough to publish a letter from one of us on the treatment of toxaemia by means of the following complex:

Aspirin	gr. x
Phenacetin	gr. v
Pulv. ipecac. co.	gr. v

It was suggested that in febrile diseases the sweat centre is paralysed by the toxins (hence the dry skin), that toxins are eliminated by the sweat (hence the moist skin which accompanies recovery), and that the complex tends, without producing ill effects, to restore the centre to action. Since then the treatment has been extensively tested with very considerable success in a number of acute febrile diseases—measles, pneumonia, diphtheria, erysipelas, puerperal fever and sepsis generally, inflammation and threatened abscess (before pus formation), and the like. Even in pyorrhoea it gives quick but only temporary relief. The action in erysipelas is typical and striking. If given early and continued day by day, the guide being the temperature, the inflammation will be reduced at the site of origin, commonly within twenty-four hours, and the patient will declare himself much relieved; but there will be a ring of inflammation, somewhat narrow and faint (comparable to the ring in ringworm), round the original site. Next day the ring will have retreated farther and be fainter, and so on, day by day. About the fifth or sixth day the patient will have recovered.

The almost invariable result of this treatment in acute disease is sweating, fall of temperature, and immediate relief from pain and feelings of illness. The signs and symptoms may, commonly do, recur; but they can be reduced again and again. In any case, the illness tends to run a short course of

reduced severity. A more extended statement is in preparation. Meanwhile we have had no opportunities of trying the treatment in small-pox. May we appeal for help to your readers, and express the hope that they will publish their results? Our hopes, we may almost say expectations, are that, if the treatment be employed early in the disease, vesication may be prevented; or, if not vesication, pustulation; or if not the prevention of pustulation, at least a mild attack may be secured.—We are, etc.,

R. J. G. Parnell, Surg. Comdr. R.N.
Stephen Green, M.B., Ch.B., D.P.H.
G. Archdall Reid, M.B., C.M.

Southsea, Nov. 7th.

THE OUTBREAK OF SMALL-POX AT POPLAR WORKHOUSE.

Sir,—I have read with interest your report on the above outbreak appearing in the British Medical Journal for this week. In many ways the outbreak appears to resemble closely the one which occurred in the Mile End Infirmary in 1911. That outbreak originated in an overlooked case, a girl of 12, who was allowed to remain unisolated in the institution until the occurrence of secondary cases revealed the true nature of her illness. The outbreak resulted in nearly 70 cases, 10 of which proved fatal. In the press reports of the outbreak, although the neglect of vaccination in the East End of London was emphasized as a cause of the outbreak, no mention was made as to the vaccinal condition of the unrecognized case, who as a matter of fact was a vaccinated child.

In the present outbreak at Poplar also no mention is made in your report as to the vaccinal condition of the patient whose overlooked attack is responsible for the outbreak. Judging by past experience I think we may conclude that he had been vaccinated. It is unlikely, had he been unvaccinated, that his attack would have been unrecognized. I feel fairly confident, therefore, in surmising that he had been vaccinated, and, if this is so, it will be interesting to learn whether his attack was one of those modified attacks which so often occur in vaccinated subjects, and in which diagnosis is so difficult that mistakes easily occur and cause so much mischief by spreading the disease.—I am, etc.,

Town Hall, Leicester, Nov. 13th. C. Killick Millard.

THE WHITE MAN IN THE TROPICS.

Sir,—In your article, "The Place of the White Man in the Tropics," you make some statements which do not seem sufficiently explicit. I have not read Dr. Hewetson's paper, but most of the points reproduced by you will be readily understood by anybody with a knowledge of the tropics, though I prefer to think that a more limited indulgence in "cocktails" and such-likes and a better appreciation of the fitness of things will win for the tropics a more favourable reputation.

Your article seems to suggest that both the coloured and the white races appeared on the face of this earth at the same time, and that the coloured races were in the tropics or migrated to that region to suit their colour. This idea conflicts with the long accepted theory that pigmentation is a response of Nature to the heat of the sun—an adaptive modification so commonly seen in the animal world.

Not long ago Sir Arthur Keith, doubtless working on these lines, elaborated the pigmentation theory. He was of the opinion that at first all were white people, and that the colour of the tropical man was due originally to a mild chronic affection of the suprarenals caused by the tropical conditions, and that subsequently the system acquired a habit of constantly producing the pigment. This theory of resultant pigmentation gains support from the historic fact that both the Hindu and the Anglo-Saxon are of the same Aryan family, their present differences being probably due to the climatic conditions of the parts they migrated to.

If evolution, ethnology, and the pigmentation theory, with—if you will—Keith's elaboration of it, be accepted, one wonders why now the white man should not be able to live and colonize permanently in the tropics if he will live a sober and regulated life. I do not mean that the physical qualities of the offspring in the tropics must or will necessarily be the same as his ancestors; but is that not a detail?—I am, etc.,

London, Nov. 4th. A. Annesley Gomes, F.R.C.S.

*** Far be it from us to pretend to settle, in the course of a paragraph, the vexed question of the origin of the races of man. Though some respectable authorities have held the contrary opinion, it is perhaps probable that all races are derived from a single ancestral stock, but if so the separation of the several races now existing must have occurred so far "in the dark-backward and abysme of Time," that we may properly regard the white man, the yellow man, and the negro as aboriginal.

ROYAL COLLEGE OF PHYSICIANS OF LONDON.

Sir,—I deplore the relaxation of the Regulations as affected by the repeal of By-law CXIV. I am of opinion that "the honour and dignity" of the College will be impaired thereby, and that the proofs of "general culture" as at present required will be lowered. In order to counteract this tendency I submit that exemptions to candidates over 40 years of age should be abolished, and that no candidate should be admitted to examination under 30 years of age; also that the examinations in languages should apply to all candidates, and that especially the examinations in Latin and Greek should be expanded, made more comprehensive and more thorough. Membership of the College is now rightly regarded as the professional and educational passport to the Fellowship; therefore the general standard should be raised, especially in view of the new by-law.—I am, etc.,

November 10th. M.R.C.P.

DERMATITIS AMONGST CEMENT WORKERS.

Sir,—With reference to the letter from Dr. S. Norman Dykes, published in the British Medical Journal of October 28th, the following case may be of interest:

J. T., a man aged 38, describing himself as a plasterer's labourer, consulted me in February, 1921, for a desquamating rash, limited to a few spots on the arms and hands. I saw him only once then, and gave him arsenic internally and calamine ointment, which apparently cleared the condition up. I saw him again in September, 1921, when the condition had recurred more extensively, with much itching. I then treated him with a lotion containing lead, tar, and glycerin, but he was back again in November worse than ever. In December I certified him unfit for work, when the condition rapidly cleared up. In April, 1922, he came again, with both hands and forearms completely covered with a profusely exfoliating eczema, similar to that described by Dr. Dykes. This proved very obstinate. Of a variety of lotions and ointments which I tried, I think it improved most with ung. terr., "Fuller's." It has gradually cleared up, but the man is still unfit for work. He told me that his work was chiefly with cement, and that several other men working with him were similarly affected to a less degree.

Perhaps the most interesting feature of the case, regarding it as an occupational disease, lies in the fact that the patient was successful in securing compensation under the Workmen's Compensation Act. His approved society took it up, as I was prepared to certify that I considered the condition due to the man's work, and apparently the employer's insurance company did not make any difficulty about paying compensation. At all events the case did not go to court. This leads me to believe that these are not isolated instances, and that we must recognize cement as a cause of occupational eczema.—I am, etc.,

York, Oct. 31st. J. C. Lyth.

ALOPECIA AREATA AND STRABISMUS.

Sir,—I have read with much interest the comments made by Dr. Charles F. Harford, in his letter of September 30th, and by Dr. W. Inman, in his letter of November 4th, upon my paper, "Alopecia areata and strabismus," contributed to the proceedings of the Dermatological Section at the recent Annual Meeting. I hope to make, at an early date, the further investigations suggested by Dr. Inman.—I am, etc.,

Glasgow, Nov. 12th. J. Goodwin Tomkinson.

Universities and Colleges.

UNIVERSITY OF OXFORD.

The gift of £100,000, made in accordance with the will of Sir William Dunn for the establishment of a school of pathology at Oxford, will be formally reported to a congregation next week, when a proposal to allocate a site in the parks will be made. The gift is subject to the condition that the University shall provide a site, and make permanent provision for the upkeep of the chair of pathology with a full teaching staff. The school is to be known as the Sir William Dunn School of Pathology. The trustees have also offered £3,000 for the adaptation of the existing department of pathology for the school of pharmacology.

UNIVERSITY OF LONDON.

Graham Scholarship in Pathology.—As announced in our advertisement columns, applications for the Graham Scholarship in Pathology must be received by the Principal Officer of the University of London, South Kensington, S.W.7, not later than by the

first post on January 1st, 1923. The scholarship, which is of the value of £300 per annum tenable for two years, was founded under the will of the late Dr. Charles Graham, to enable "a young man to continue his pathological researches and at the same time to secure his services to the School of Advanced Medical Studies connected with the University College Hospital as a teacher under the direction of the Professor of Pathology."

UNIVERSITY OF GLASGOW.

THE following degrees were conferred on November 11th:

M.D.—John Stewart (with commendation).
M.B., CH.B.—W. Morison, G. J. Mullen.

UNIVERSITY OF DUBLIN.

THE following candidates have been approved at the examinations indicated:

FINAL M.B., PART I.—*Materia Medica and Therapeutics; Medical Jurisprudence and Hygiene; Pathology and Bacteriology:* *R. F. J. Henry, *L. C. Brough, *J. R. Bradshaw, *M. A. Gerrard, G. A. Sloan, A. J. Mooney, J. McClelland, Evaline E. Mooney, S. Wigoder, D. K. Lyons, Lucy M. Joly, W. A. Taylor, R. K. Carson, R. L. G. Proctor, H. Isaacson, S. E. Magowan, F. V. Duke, I. J. Isaacson, Dorothy J. Booth, P. B. Robinson, L. M. Whitsitt, J. S. Armstrong, L. MacS. Bell, S. Narunsky, W. A. Redmond, P. P. Van der Merwe, J. E. Stokes, Lucy E. R. Pigott, H. W. Strong. *Materia Medica and Therapeutics; Medical Jurisprudence and Hygiene, in completion:* W. L. W. Smith. *Pathology and Bacteriology, in completion:* S. McDermott, Gladys Weatherill, A. V. B. Crawford. *Materia Medica and Therapeutics, Medical Jurisprudence and Hygiene only:* J. E. Beatty, J. L. Levingston, C. Lord-Flood, J. Craig, P. C. de Plessis. *Materia Medica and Therapeutics; Pathology and Bacteriology only:* J. L. Marshall, A. Hawthorne. *Medical Jurisprudence and Hygiene; Pathology and Bacteriology only:* P. D. Piel. *Medical Jurisprudence and Hygiene only:* H. Birney.

D.P.H., PART I.—*Chemistry, Bacteriology, Physics, and Meteorology:* T. F. Wilson.

DIPLOMA IN GYNAECOLOGY AND OBSTETRICS.—H. S. Jacobs.

* Passed on high marks.

NATIONAL UNIVERSITY OF IRELAND.

AT a recent meeting of the Senate the following, among other awards, were made:

Medical Travelling Studentship (*Pathology*).—Theobald W. T. Dillon, M.B., B.Ch., University College, Dublin.

The Dr. Henry Hutchinson Stewart Medical Scholarship.—*Physiology:* Catherine Mary O'Brien, University College, Galway; *Anatomy:* John Mowbray, University College, Dublin.

The Senate decided that the conferring fee for all Bachelors' and Masters' Degrees should be £5 (except in the case of medicine and dentistry, the conferring fees for which should remain unchanged).

ROYAL COLLEGE OF SURGEONS OF ENGLAND.

AN ordinary meeting of the Council was held on November 9th, when Sir Anthony Bowlby, President, was in the chair.

Issue of Diplomas.—Diplomas of membership were issued to the candidates found qualified at the recent examinations. (The names were printed in our report of the comitia of the Royal College of Physicians, published in our issue of November 4th, p. 894.)

Alterations in the Regulations for the Conjoint Degree.—These, which have been approved also by the Royal College of Physicians, will come into force, and be applicable to candidates who have not passed the required preliminary examination in general education before January 1st, 1923.

The President reported that Mr. K. M. G. Bailey had been elected the Streatfeild research scholar, and that Sir John Lynn-Thomas had been appointed a member of the Advisory Board of Medicine of the University of Wales.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH.

AT a meeting of the Royal College of Physicians of Edinburgh, held on November 7th, Sir Robert Philip, President, in the chair, J. R. Currie, H. A. Foy, G. Lange, N. Hirschman, and H. J. Parish were elected to the Membership of the College.

The Honorary Fellowship of the College was conferred on Professor Bordet of the Institut Pasteur, Brussels, on account of his distinguished services to medical science; and the Honorary Membership of the College was conferred upon Sir Temulji Nariman, The Fort, Bombay, in recognition of his services to medical education in India.

ROYAL COLLEGE OF PHYSICIANS OF IRELAND.

WILLIAM JOSEPH DEIGHAN, L.R.C.P. and S.I., having passed the examination, has been duly admitted a Member of the College.

The Services.

NAVAL MEDICAL MEMORIALS.

A BRONZE tablet erected at the Royal Naval Hospital, Chatham, to commemorate the medical officers and members of the nursing staff of the hospital who gave their lives during the war was unveiled by Surgeon Vice-Admiral Sir Robert Hill, Medical Director-General of the Royal Navy, on November 11th. The memorial having been dedicated by the Rev. H. Lloyd, R.N., a wreath was placed at its base by Surgeon Rear-Admiral G. A. Dreaper, C.B.

AUXILIARY R.A.M.C. FUNDS.

AT the recent quarterly committee meeting of the Auxiliary Royal Army Medical Corps Funds, grants were made to cases in the Benevolent Branch for the orphans of officers, amounting to £111 5s. 11d., and grants in the Relief Branch for the widows and children of the rank and file, amounting to £1,301. These funds are for the relief of widows and orphans of commissioned officers, non-commissioned officers, and men of the rank and file of the Royal Army Medical Corps, Special Reserve, Territorial Force and New Armies, and also for the relief of the children of those who have been so severely disabled in the late war that they need help for the education of children. Requests for relief should be addressed to the Honorary Secretary, at the Offices of the Funds, 11, Chandos Street, Cavendish Square, W.1.

Obituary.

J. M. RATTRAY, M.D.,
Late of Frome.

DR. J. M. RATTRAY, of Frome, who was very well known to members of the British Medical Association ten or fifteen years ago, owing to the frequency of his attendance at the Annual Meetings, died suddenly in London on November 4th.

John Moysey Rattray was the son of Dr. John Rattray of Aberdeen, and was born in that city in 1857. He graduated M.A.Aberdeen in 1877, M.B., C.M. in 1882, and M.D. in 1891. After holding the appointment of house-physician to Aberdeen Royal Infirmary he settled in Frome, where he enjoyed a large practice and took an active share in the life of the town. He was for many years police surgeon and medical officer of the union, and at the time of his retirement was senior honorary medical officer to the Frome Victoria Hospital. He was also connected with the St. John Ambulance Association, for which he was a lecturer. He became a member of the British Medical Association in 1883; he was a member of the Bath and Bristol Branch Council for two periods and president of the Branch in 1911. In 1910 he was chairman of the Trowbridge Division of the Association. Dr. Rattray's health had never been robust, and in May, 1917, he was shot at and rather seriously injured by a patient who was in a state of great mental excitement. A long illness ensued, and eventually Dr. Rattray retired from practice and settled in London. He took a great interest in historical subjects, especially those connected with Scotland, and frequently wrote upon them, for he had a facile pen. He was a Fellow of the Royal Historical Society.

He was a man very much esteemed by all who knew him. His honesty of purpose was transparent, and his kindness of heart was constantly finding expression. The funeral, which took place at Frome on November 9th, brought together a very large attendance of friends, and during the day the flags on the public offices and the Conservative Club were flown half-mast.

T. W. PARRY, M.R.C.S.ENG., L.R.C.P.EDIN.,
Ferndale, Glamorgan.

THE death took place on November 3rd at Ferndale, Glamorgan, from bronchopneumonia of Dr. Thomas William Parry, J.P. He was born at Dolgelly, North Wales, in 1848, and was educated at Edinburgh, where he was considered one of the best students of his year; he took the diplomas of L.R.C.P.Edin., M.R.C.S.Eng., and L.S.A. in 1871. Some fifty years ago he settled at Ferndale, then a small place of about 1,000 inhabitants, where collieries were being sunk; the population has now increased to 25,000. Dr. Parry became surgeon to the collieries and identified himself with every social and philanthropic movement for the welfare of the district. He was greatly beloved by his patients, and his skill as a surgeon was recognized beyond his own area. He retired from active practice twelve years ago, when he was presented with a valuable testimonial by the townspeople. He was one of the senior magistrates of Glamorgan, and until recently sat regularly at Porth police court, where his portrait was unveiled a short time ago. Dr. Parry was an old member of the British Medical Association and was seldom absent from the Annual Meeting. He was a member of the Council of the South Wales and Monmouthshire Branch from 1888 to 1892, and was Vice-Chairman in 1905 and Chairman in 1906 of the North Glamorgan and Brecknock Division. In 1877 he was one of the twelve medical practitioners who were awarded the Medal for Distinguished Merit of the British Medical Asssociation for heroic conduct and self-denial at

a colliery disaster at Pontypridd. Dr. Parry's wife and two of his daughters died some years ago; he is survived by his two younger daughters.

S. H. writes: As an old assistant of Dr. Parry, I desire to pay a tribute to his many estimable qualities. He was a fine representative of the old school of doctors, possessing a remarkable personality. He was a skilful surgeon, and, working without even the advantage of a cottage hospital, he performed many skilful operations in the homes of his patients. He was a charming colleague, and his invariable good humour relieved the sense of tedium associated with medical practice in the grey surroundings of a colliery district. He was always most sympathetic, and his outlook on life was optimistic. As Horace says (*Odes*, II, 3):

> "Omnes eodem cogimur; omnium
> Versatur urna, serius, ocius,
> Sors exitura."

Medical News.

DR. J. J. E. BIGGS, O.B.E., has been re-elected Lord Mayor of Cardiff. Seven members of the medical profession have been elected to the office of Mayor: Dr. E. A. Farr, Andover (re-elected); Dr. C. F. Oldacres, Daventry; Dr. J. T. T. Ramsay, J.P., Blackburn; Dr. F. L. Thomas, Barnstaple; Dr. H. Tibbits, Warwick (re-elected); Dr. H. S. Walker, Louth (re-elected); Dr. J. W. Cleveland, St. Albans. The Lord Mayor of Cardiff and all the medical mayors with one exception are members of the British Medical Association.

THE annual old students' dinner of St. Thomas's Hospital was held on November 10th, at Princes Restaurant, Piccadilly, with Sir Charles Scott Sherrington, President of the Royal Society, in the chair. The company, which numbered over 200, included Sir Anthony Bowlby, President of the Royal College of Surgeons, Sir Robert Hill, Medical Director-General, R.N., Sir George Makins, Sir George Newman, Sir R. Havelock Charles, Sir Seymour Sharkey, Sir F. Stanley Hewett, Sir Arthur Newsholme, Sir Walter Fletcher, Sir Archibald Reid, and Sir William Thorburn. The chairman, in proposing the toast of "St. Thomas's Hospital and Medical School," referred to his own days as a student at the medical school, and spoke of its present prosperity. Sir Cuthbert Wallace, dean of the medical school, who replied, reviewed the year's doings, sporting as well as academic. He regretted the absence of the treasurer, Sir Arthur Stanley, on account of the general election campaign, but he could state that the finances of the hospital were healthy and were now within measurable distance of balancing, the deficit being only about £3,000. The scheme for the erection of a war memorial was now well in hand. The health of the chairman was proposed with a wealth of encomium by Sir Charles Ballance, and was received with acclamation, and Sir Charles Sherrington briefly responded.

A CHANCEL screen erected in the chapel of the Horton Mental Hospital, Epsom, in memory of the fallen members of the hospital and those who died on service at the institution when it was a war hospital, was unveiled on November 11th. On each side of the screen is a memorial tablet bearing the names of fifteen members of the mental staff, and eleven names of the war staff, including a sister, a nurse, and four captains of the R.A.M.C.

A POST-GRADUATE course on recent progress in surgery and orthopaedics, urology, and obstetrics and gynaecology, with special reference to treatment, to be given by members of the medical faculty of Vienna, will begin on December 4th and terminate on December 16th. The hours from 8 to 11 and 3 to 6 will be occupied on each day. The first lecture will be given by Professor A. Eiselsberg, on the lessons of war surgery for civilian surgery. Particulars as to this course can be obtained from Dr. A. Kronfeld, Porzellangasse 22, Wien IX. Another course of the same kind will be held next year from February 12th to 24th. Courses of instruction in special subjects can also be obtained in Vienna during December.

AT the meeting of the Medico-Legal Society to be held at 11, Chandos Street, W.1, on Tuesday, November 21st, at 8.30 p.m., Earl Russell will read a paper on the ethics of suicide.

DR. PORTER PHILLIPS will read a paper on "The position of insanity in criminal law" before the Hunterian Society, on Monday, November 20th, at 9 p.m., at the Cutlers' Hall, Warwick Lane, Newgate Street. Members of the medical profession and of the Medico-Legal Society are invited. A discussion will follow the paper.

DR. HARVEY HILLIARD, formerly Chairman of the Westminster Division of the British Medical Association, is among the recipients of honours bestowed by His Majesty on the advice of the ex-Prime Minister; he is created a Companion of the Order of the British Empire in recognition of public services.

A PAPER on "The economy of smoke abatement" will be read before the Royal Society of Arts, John Street, Adelphi, W.C.2, on Wednesday, November 22nd, at 8 p.m., by Ex-Bailie William B. Smith of Glasgow, a member of the Departmental Committee on Smoke Abatement. Lord Newton will preside.

THE annual dinner of the Chelsea Clinical Society will be held on Wednesday, November 22nd, at 7.30 o'clock, at the Café Royal, Regent Street, W.1.

A MEMORIAL fund has been opened to the late Sir Charles Ryall, C.B.E., F.R.C.S., by the Cancer Hospital, Fulham Road, London, at Coutts Bank. It is proposed that, subject to the necessary funds being forthcoming, the memorial shall take the form of a new operating theatre unit.

THE Department of Scientific and Industrial Research has issued a report of its Food Investigation Board (H.M. Stationery Office, 1s. 6d. net) on the transmission of heat by radiation and convection. It relates a large number of experiments made by Mr. Ezer Griffiths, D.Sc., and Mr. A. H. Davis, M.Sc., directed especially to problems of insulation connected with cold storage construction. Ultimately the inquiry extended beyond this, and yielded results which will be of considerable interest to physicists.

THE Chelsea Clinic of Auto-suggestion, 268, King's Road, S.W., was opened in October, 1921, and is in charge of Dr. Monier-Williams and Dr. Charles Harford, who are testing the treatment of disease of organic as well as of functional origin by the method of collective auto-suggestion initiated by M. Emile Coué of Nancy and expanded by Professor Baudouin of the Geneva School of Psychology. The clinic being entirely free is intended for patients unable to afford ordinary professional fees. Medical practitioners are invited to send any cases they consider suitable. Women are seen on Wednesdays at 5.15 and men on Fridays at the same hour.

A PUBLIC lecture on the pasteurization of the public milk supply will be delivered at University College, London, by Dr. Henry Kenwood, C.M.G., Edwin Chadwick Professor of Hygiene and Public Health, on Thursday, November 23rd, at 5 p.m. The chair will be taken by Sir William Collins.

THE Hunyadi Janos bitter water can now again be obtained in this country. The water is very well known, and the proportion of salts in it is clearly very constant, since the analysis made by Liebig agrees very nearly with others made in recent years. The principal salts are magnesium and sodium sulphates; both are present in the proportion of about 16 parts in the 1,000. The water is bottled at the springs, which rise a few miles south of Budapest, and great care is taken to ensure that the water exported is uniform and free from accidental contamination. The English agents are Messrs. Ingram and Royle, 45, Belvedere Road, London, S.E.1.

DR. R. A. DART has been appointed Professor of Anatomy in the University of Witwatersrand, Johannesburg. He is an Australian by birth, and first attended the University of Queensland, where he took the degree of M.Sc. Afterwards he studied medicine at Sydney University, and graduated M.B., M.S. He served with the Australian Expeditionary Forces, and when demobilized became senior demonstrator of anatomy and lecturer on histology in University College, London, under Professor Elliot Smith.

MESSRS. J. AND A. CHURCHILL announce for early publication: *Sterility in Women, Its Causes and Treatment*, by Dr. R. A. Gibbons; *Applied Pharmacology*, by Dr. A. J. Clark, Professor of Pharmacology, University College; *The Theory of Emulsions and Emulsification*, by Dr. W. Clayton; the second edition of Dr. J. D. Gimlette's *Malay Poisons and Charm Cures*, with a preface by Sir William Willcox; and the eighth edition of *Tomes's Dental Anatomy*, edited by Dr. Marett Tims and Mr. C. Bowdler Henry.

THE number of street accidents recorded by the Metropolitan Police during the months of July, August, and September reached the total of 15,419. Of these 198 were fatal, 174 being caused by mechanically propelled vehicles.

UP to the time of going to press the following members of the medical profession have been elected to represent the constituencies indicated in the new Parliament which will meet next week: Sir George Berry (Con.), Scottish Universities; Sir John Collie (Nat. Lib.), Glasgow, Partick; Major L. G. S. Molloy (Con.), Blackpool; Dr. A. Salter (Lab.), Bermondsey, West; Dr. T. Watts (Con.), Withington; Sir Wm. Whitla (U.), Queen's University, Belfast. Ten other medical men in the results so far declared have been unsuccessful.

Letters, Notes, and Answers.

As, owing to printing difficulties, the JOURNAL *must be sent to press earlier than hitherto, it is essential that communications intended for the current issue should be received by the first post on Tuesday, and lengthy documents on Monday.*

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* BRITISH MEDICAL JOURNAL *alone unless the contrary be stated.*

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names—of course not necessarily for publication.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C.2, on receipt of proof.

IN order to avoid delay, it is particularly requested that ALL letters on the editorial business of the JOURNAL be addressed to the Editor at the Office of the JOURNAL.

THE postal address of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is 429, Strand, London, W.C.2. The telegraphic addresses are:

1. EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand, London;* telephone, 2630, Gerrard.
2. FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand, London;* telephone, 2630, Gerrard.
3. MEDICAL SECRETARY, *Medisecra, Westrand, London;* telephone, 2630, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin;* telephone, 4737, Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh;* telephone, 4361, Central).

QUERIES AND ANSWERS.

PSYCHICAL TRAINING.

A MEDICAL practitioner, "F. J.," writes: Lord Dawson, during the course of his address published in your issue of October 28th, speaks of the psychical training of children by the aid of rhythm, relaxation exercises, etc. I should be grateful if I could be informed where I could obtain further information on this matter in both practice and literature.

LEFT-HANDEDNESS AND STAMMERING.

DR. C. L. LAPPER (Loughborough) asks for advice in regard to a boy, aged 6 years, who is left-handed from birth. "Ought he to be taught to write with his right hand? Also, Is there any "connexion" between his left-handedness and stammering speech? He has an uncle who is left-handed and has a pronounced stutter. I cannot trace any further family history of left-handedness or stammering."

WARMING THE GARAGE.

"ROVER" writes: May I ask for the experience of motor users with regard to the heating of the garage, thus avoiding the necessity of emptying the radiator every night during the winter. I do not refer to the usual steam-heater radiators, but rather to the type of stoves advertised in the motor papers.

CLIMATE FOR ARTERIO-SCLEROSIS.

"R. B.," a doctor, age 65, suffers from high blood pressure and arterio-sclerosis. He cannot afford to retire. Where—in England—in order to prolong his life is the best place for him to live? What form of light employment could he do?

A STRANGE "WILD-FOWL."

DR. FRANK G. LAYTON (Walsall) writes: The other day a middle-aged woman came into my consulting room very bashfully. Plainly she had something on her mind. She told me she had come on a very funny errand, and she did not like to talk about it. However, I managed at last to persuade her to let me have a look; and then I discovered that whatever it was she had on her mind, there was something entirely tangible on her body. On the front of her abdomen was what looked like a small pedunculated mole. I felt disappointed. It seemed a poor thing to be so bashful about. But when I turned it up with a pair of forceps, and looked at it with a lens, I found four moving legs on each side of a fat brown body, and a black shiny neck. The snout was in the lady's skin. I tried peaceful persuasion, with no luck. The beast refused to let go. Then I chloroformed him. Still he sat tight. Finally I dug his head out with a small pair of scissors, and, unhappily, the beast died and dried up; but the patient became cheerful. It appeared that she had been spending a holiday in Surrey, and that three or four days before her visit to me she noticed something pricking; but she had seen nothing till the day of our interview. Will one of your Surrey readers be kind enough to tell me what it was? For all I know that kind of beast is common in the wilds of the South; but I can find no one in the civilized Midlands who has heard of anything of its sort.

INCOME TAX.

"OXON." is about to buy a one-third share in a practice in which he has been acting as assistant for the past year. Abnormal realization of book debts has swollen the cash receipts so that our correspondent anticipates that he will in the future have to bear his share of an average assessment inflated beyond the then probable yield of the practice.

*** Under Rule 11, Cases I and II, Schedule D, "where a change occurs in a partnership of persons engaged in any . . . profession . . . the tax payable in respect of the partnership . . . shall be computed according to the profits . . . during the periods . . . prescribed"—that is, during the three years' average—"unless the partners . . . prove to the satisfaction of the Commissioners that the profits have fallen short . . . from some specific cause since such change took place . . . or by reason thereof." We suggest that "Oxon." ask the inspector of taxes whether he agrees that this provision will enable the firm to claim a reduction of the 1923-24 assessment to the profits of the year if they should fall below the amount of the assessment as determined by the past average profits. It appears to us that this claim would be in order, and that it provides an avenue of escape from the hardship which "Oxon." would otherwise suffer.

"K. A. C." is in the employment of a county council and receives an allowance of £250 a year for the use of a car in his work. He calculates that this approximately equals the annual running cost and has claimed the cost of replacing his car as a deduction from his salary.

*** We do not know the precise terms of the council's grant of £250 a year, but in general such allowances are intended to cover all *necessary* car expenses, including periodical renewal. "K. A. C." is entitled to be assessed on the salary *plus* allowance after deducting all "expenses incurred wholly exclusively and necessarily in the performance" of his duties, but we apprehend that he will find great difficulty in convincing the income tax authorities that the specific council allowance of £250 is insufficient to cover those expenses. He has, of course, a right of appeal to the General Commissioners for Income Tax of his district.

LETTERS, NOTES, ETC

HYPERTROPHY OF THE PROSTATE.

DR. J. REID writes: The common enlargement of old age is due chiefly to increase of the muscular substance. It occurs in about 30 per cent. of men over 60 (Coates's *Manual of Pathology*, 1898). Is *fibroid* prostate a disease or is it like the *muscular arm* of the blacksmith? The ergography of the prostate has not been estimated, still less the functional activity of its muscles. The disuse of muscle does not lead to hypertrophy.

NORTHUMBERLAND YEOMANRY.

AN advertisement is published this week asking for information as to Trooper J. L. Pumphrey, Northumberland Yeomanry, who was severely wounded in Polygon Wood on October 24th, 1914. He is supposed to have been sent by the 4th Field Ambulance to the convent school of St. Charles, between Potijze and Verlorenhoek, near Ypres.

THE VIOLATORS OF VACCINATION LAW.

DR. H. P. REYNOLDS, F.R.C.S.E., Public Vaccinator (Upwell, Wisbech), writes: The persons responsible for the thousands of unvaccinated people in Britain are the ignorant people called justices of the peace. A mother gets a vaccination paper for her child and at once rushes off to a J.P. with some cock-and-bull story, and secures without difficulty an order absolving the child from the operation. Every month I come across mothers who pride themselves on their cleverness; I tell them the time will come when they will regret their silly action.

MOTOR CAR SHOW IN LONDON: A CORRECTION.

THE price of the 23-60-h.p. Vauxhall-Kington open touring car, referred to in the article on the Motor Car Show in London (November 4th, p. 879), is £895, and not £1,150 as printed.

VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 34, 35, 38, 39, and 40 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 36 and 37.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page *191*.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

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Six lines and under	0 9 0
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An average line contains six words.

All remittances by Post Office Orders must be made payable to the British Medical Association at the General Post Office, London. No responsibility will be accepted for any such remittance not so safeguarded.

Advertisements should be delivered, addressed to the Manager, 429, Strand, London, not later than the first post on Tuesday morning preceding publication, and, if not paid for at the time, should be accompanied by a reference.

NOTE.—It is against the rules of the Post Office to receive *poste restante* letters addressed either in initials or numbers.